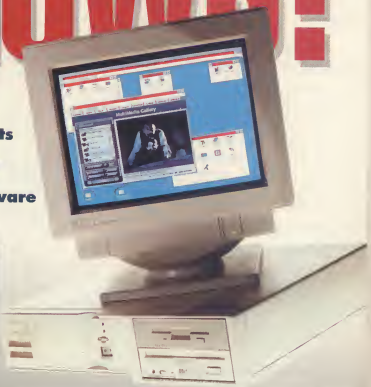
PRINTER REVOLUTION: DIRT-CHEAP COLOR IS HERE!

The Magazine for Business Computing Experts

April 1993

PC Computing

Pump Up Windows!



55 SECRET WEAPONS!

PLUS

82 Killer Spreadsheet Secrets

Coolest Multimedia Machine

Hottest Communication Software

OS/2 Tips • LapLink Lives!

Microsoft Excel has a Wizard that helps you plot nonadjacent selections of related variables with a transposed data series in a multicategory 3-D chart.

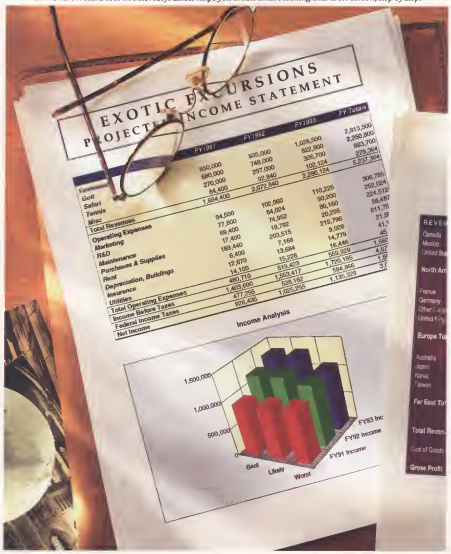
Loosely translated, it just me

All of the spreadsheet innovations in the world don't really matter, if they don't work for you. Which is why all the innovations in Microsoft® Excel are designed to do just one thing: make your everyday job easier.

In order to achieve this goal, our product development team spends countless hours studying the way you work with your spreadsheet. Talking to you about the things you need to do with your spreadsheet. And listening to things you'd like to do with your spreadsheet, but can't.

For example, they discovered you like to put charts into your documents, but that often you don't. Why? Because it's too hard to do with your current spreadsheet. So they designed a tool that helps you create a variety of smart-looking charts on-screen, step by step. It's called the ChartWizard. And it's so easy to use, it actually feels a little like magic.

The ChartWizard tool in Microsoft Excel helps you create smart looking charts on-screen, step by step.



They also found there are a number of things you have to do over and over again that are time consuming, and tedious. Like filling in dates. Or formatting your worksheets. Or adding up countless rows and columns of figures.

To put an end to this and add some "zing" to creating a worksheet, we developed a set of tools that can accomplish most everyday tasks

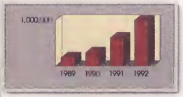
*Each year shows approximate total number of users who have switched. Microsoft Excel 4.0 for Windows has a 90-day money-back guarantee. †See reseller for details. Plus freight and applicable sales tax. Offer good through June 30, 1992, and only in the 50 Unit HYS. For information only. In Canada, call (800) 563-9048; outside the U.S. and Canada, call (206) 936-8661. © 1992 Microsoft Corporation. All rights reserved. Printed in the USA. Microsoft is a registered trademark and Windows and Autosum are t

ans it's easier.

with just the click of a mouse. We call them "Autoformat, Autofill and Autosum."* And they work just the way they sound – automatically.

Type January into the first cell, and Autofill will instantly fill out as many (or few) months ahead as you indicate on your worksheet. Hit Autoformat and you can instantly apply a professionally designed format to your worksheet, so that the data points you make will stand out. And Autosum can give you the numbers you want faster than you can say, "one-two-three."

Over a million Lotus users have already made the switch to Microsoft Excel: the leading spreadsheet for Windows.



All of which has helped more than a million Lotus® users make the switch to Microsoft Excel for Windows – the number one spreadsheet for Windows.™

Finally, we've not only made Microsoft Excel easier to use, we've also made it easier to get. Because right now you can make the switch for only $129.† Just call us at (800) 426-9400, Department HY8. Or visit your nearest reseller.

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98,826

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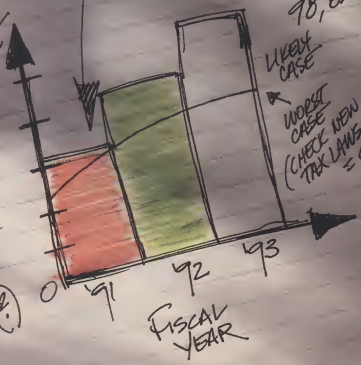

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Action! 2.5 for Windows offers many exciting new features, including data-driven motion charts with DDE links, as well as support for the newest digital video formats.

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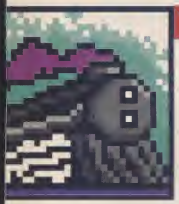

Cover Story

110 A Better Windows Than Windows
BARRY SIMON
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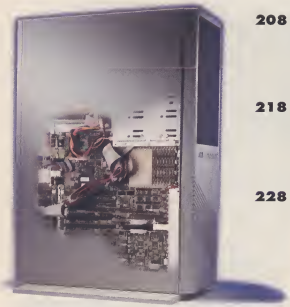

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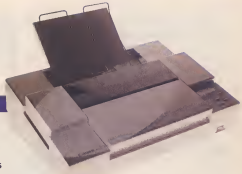

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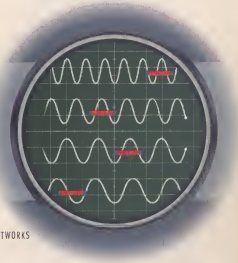

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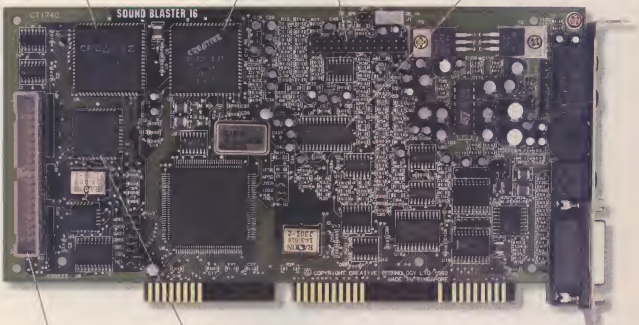

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DRAWING											
▸ Supports TrueType & Type 1 fonts	●	●	●	●		●			●	●	Industry standard font formats
▸ Interactive on screen kerning	●							●			Click and drag text kerning
▸ Spelling dictionary	●	●	●	●							Catches your spelling mistakes
▸ Hyphenation	●										Improves word spacing in narrow columns
▸ Thesaurus	●										Synonyms are just a mouse click away
▸ Text remains editable when											
⊛Rotated/skewed	●					●	●				Correct spelling mistakes and make font changes without
⊛Extruded	●										removing transformations or special effects
⊛Fit to a curve	●					●	●				
⊛Enveloped	●										
▸ Recolor characters individually	●	●	●	●							No need to separate text string
▸ Number of fonts	253	13	22	15	175	40	4				Target your audience with the right font
▸ Blend shapes and colors	●						●				Realistic shading & novel shape transformations
⊛Automatic rebleinds	●						●				Live blending allows for instant feedback
⊛Blend along a path	●										Blend elements can follow a chosen path
⊛Blend groups of objects	●										Several objects can be blended at once
⊛Link blends together	●										Blended objects can remain grouped
▸ True mathematical perspective	●										Object recedes towards a movable vanishing point
▸ Envelloping	●										Warp any object using a rubber-band envelope
▸ Generate 3-D extruded objects	●										Convert 2-D objects to 3-D appearance
⊛Rotate and recolor	●										Rotate in 3-D space with automatic color refresh
⊛Simulate light source	●										Create realistic shading with a movable light source
▸ Fit text to path											
⊛Interactive placement of text	●					●					Click and drag text along path
⊛Align to baseline, ascender, descender	●						●				Adjust vertical position of text above, below or on path
⊛Fit multiple text strings to path	●										One path can be used for multiple text strings
⊛Autoupdate when path is changed	●					●	●				Text reflows automatically when path is altered
▸ Maximum number of layers	Unl				64		Unl				Simplify complex drawings with multiple layers
▸ Lock, hide and print layers	●										Extensive layer controls let you work effectively
▸ Number of graphics import filters	16	9	14	7	10	9	5				Import charts and graphics
▸ Number of graphic export filters	18	5		5	10	10	12				Export to all popular programs
▸ OLE Support	●		●		●					●	Allows quick access to your drawing
▸ Pantone and TruMatch color systems	●				●						Industry standard color matching systems
CHARTING											
▸ Number of chart types available	79	15	19	35		6					Choose the chart type that best suits your data
⊛Ring pies, 3-D bar, scatter & surface	●										Add impact using a variety of chart types
⊛Histograms	●										Show frequency of values in a data set
⊛Pictographs	●										Show data using a repeated picture
⊛Dual axes	●		●								Allows two sets of values for X or Y
⊛Bipolar charts	●		●								Split chart at zero point for positive/negative values
▸ Rotate, zoom 3-D charts	●										Interactive 3-D manipulation
▸ Number of series	Unlim	26	4000	16		1000					Chart more data
▸ Number of pies per chart	4	1	1	6							Compare more data sets
▸ Remove and restore pie slices	●			●							Add emphasis by removing slices
▸ DDE links	●		●	●							Update chart data automatically with DDE links
▸ Excel 3.0 import	●		●	●							Use existing Excel data to create charts
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▸ Number of transition effects	6	13	45	15	4						Variety of transitory wipes used between slides
▸ Control transitions per slide	●	●		●	●						Assign different transitions for each slide
▸ Automatic or manual slide shows	●	●	●	●	●						Timed self-running or manual advance
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▸ Special effects filters	12								8	27	Apply special effects like motion blur, emboss, etc
▸ Paint tools: brush, airbrush, paintcan	●								●	●	Create images from scratch using basic painting tools
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▸ Apply filters to selected areas only	●								●	●	No need to cut and paste
▸ Channel response curve control	●								●	●	Adjust color channels as needed
▸ Color replacer	●								●	●	Search and replace colors or range of colors
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Hot Inside Tips: Bott's Racing Form For the 1993 Software Derby

PSSSST! WANT A HOT TIP? NEXT TIME YOU GO SOFTWARE shopping, take a long look at the company behind the shrink-wrap.

Good software packages make dazzling first impressions; the great ones have staying power. You're in business for the long haul—you need solid assurance that your software company will be there next year, with a well-defined upgrade path, talented developers to exploit new hardware and operating systems, and a real commitment to service and support.

You could ask Wall Street for its analysis, but what kind of advice can you expect? In a stock-picking contest sponsored by the *San Francisco Chronicle*, a trained orangutan beat five out of eight professional money managers by throwing darts at the business section.

No, to separate the winners from the also-rans, there's only one place to go: the racetrack. Here's how I'd handicap the top software companies. Prepare to place your bets, but remember—the odds can change fast.

Microsoft: The even-money favorite. It's too bad the name Seattle Slew is already taken, because it's a perfect description of the Microsoft strategy. If Bill Gates had a string of thoroughbreds, they'd be tended by 9,000 stable hands, half of them assigned to tell us how fast they'll run next year. They run on a fast track, in mud and muck, probably even on broken glass—but not, for some reason, on OS/2 2.0.

Microsoft's entries are usually unimpressive their first time out, but the hired hands have learned the secrets of patience and persistence, and by the second or third try they usually have what it takes to win. Some folks, including a few from the Federal Trade Commission, think it's easier to win races when the owner also owns the racetrack. We'll find out later this year whether they're right. Meanwhile, at 6 to 5 they're the safest bet around, as long as you don't mind following the crowd.

Novell: The reincornotion of Big Red. The last time Secretariat ran in a Triple Crown race, he won by the length of the grandstand. They called him Big Red, and it's sheer poetic justice that NetWare ships in a big red box. Novell has an early lead in the crucial networking race, and enough in reserve—technologically and financially—to maintain that advantage against any challenger. Today's serious business apps have to run with Windows and NetWare. The odds are 2 to 1 and getting better by the minute.

Borland: "They're not horses, they're objects with the properties of o horse." Two years ago, it looked like Philippe Kahn, with his near-obsessive devotion to object-oriented technology, had figured out how to develop a contender. But the Barbarians stumbled badly at the gate with two big Windows products, Quattro Pro and Paradox. Borland has some classy applications, but the race is rarely decided by who has the better technology. Can you give the competition a ten-length head start and still hope to cross the finish line first? Maybe. Borland's still a good bet at about 4 to 1.

Lotus: Still running, after all these years. They've got the best word processor (Ami Pro 3.0), the best presentation graphics program (Freelance Graphics), and a killer networking strategy. So why is Lotus a long shot? Because the big horse in the barn is a 10-year-old that's held together with Ace bandages and cortisone, and the one-time champ hasn't run a good race in years. Take 10 to 1, and bet 'em to show. I mean, Lotus is sure to run 1-2-3, right?

WordPerfect: The people's choice. If nice guys finish last, how come WordPerfect 5.1 is still in the winner's circle every month? You can knock its methods, but you have to admire a company with such single-minded devotion to its supporters. WordPerfect's never had a big win with anything except a word processor, though, and it could slip to third in that category unless WordPerfect for Windows can hold off Microsoft Word and Ami Pro. With those threats, it deserves to be 12 to 1, but the crowd may make it the sentimental favorite.

IBM: Big Blue pulls out all the stops. How fast can a horse run with an 800-pound gorilla for a jockey? IBM has a champion-class operating system in OS/2 2.0, but there are plenty of furlongs to go before it can be declared the winner. Meanwhile, Team Microsoft is getting Windows NT ready for a great winner-takes-all race. OS/2 is odds-on if the race is held in Corporate America; otherwise, Big Blue is a big long shot at 15 to 1.

Symantec: Counting on Bedrock for o big run. Symantec's old stars, Q&A and TimeLine, haven't done much lately, but the Peter Norton division is still going strong on Windows, the Mac, and OS/2. Symantec's Bedrock technology, a tool that lets developers move applications from one GUI to another quickly and without fuss, could be a secret weapon. An interesting long shot at 50 to 1.

Place your bets—but remember, the odds can change fast.

Computer Associates: Still looking for that first big win. On the Windows side of the backstretch, nobody has more horses and more good intentions than CA. Every app has potential, but this mainframe software giant has yet to develop a Windows application that can outrun the best from Microsoft, Borland, and Lotus. Until that day, they'll remain a 99-to-1 long shot.

Was your favorite company left at the gate? Send predictions and revised odds to Software Derby, c/o *PC/Computing*, 950 Tower Lane, 20th Floor, Foster City, CA 94404. ◩

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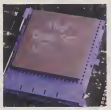

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The Battle Rages over MIS Credibility

Bob Vila's "Old" PC, hexed chips, more MIS madness, and MIS-representations

MIS Fires Back

About Ed Bott's January column ("Get a Clue, MIS! Pay Attention to Next Year's Best-Sellers," page 20): If MIS is going to be held responsible, then MIS needs to decide when a product should be used. MIS is under enough pressure to support a bewildering array of products, and with the onslaught of new releases, support (or hand-holding) is a difficult task.

RAYMOND H. THOMPSON
OLIVER SPRINGS, TENNESSEE

Our problems lie in getting senior management to comprehend what MIS does! Only recently have corporations begun to realize that the more money they put into their MIS departments, the more they can achieve. Maybe the MIS people you refer to were in a typical position—without the resources to obtain current hardware and software. I think you're giving MIS a bad rap.

NAME AND ADDRESS
WITHHELD UPON REQUEST

It might do Ed Bott good to get out of his office and see what the rest of the world is using. Not everyone needs a 486, a color laser printer, networking ability, and an oversize monitor.

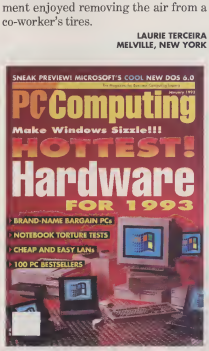
TED SILVERMAN
MIAMI, FLORIDA

Since when does MIS purchase anything? Your suggestion that the success in 1992 of Windows PCs with skimpy hard drives, 286-based PS/2 Model 50s, and dot matrix printers is the result of MIS's ignorance is at least a narrow-minded view and at most slander to MIS professionals. I'd bet that many of those systems were for LANs or for schools. Dot matrix printers and low-cost PCs with small hard drives and memory supplies are attractive to budget-strapped colleges and public schools.

DOUGLAS K. GARDNER
WALKERSVILLE, MARYLAND

My MIS horror story is just that—a horror! One employee in our MIS department enjoyed removing the air from a co-worker's tires.

LAURIE TERCEIRA
MELVILLE, NEW YORK



Just How Old Is Old?

Congratulations on the first installment of "This Old PC" (January, page 212). The series is sure to be a hit.

AMEED TAYLOR
PASADENA, CALIFORNIA

I was excited to see "This Old PC" in the January issue. But "Old PC"? I expected to be walked through an upgrade of something more like my faithful old tortoise—an XT with a 10MB hard drive. I'm waiting for "This Truly Old PC."

ELAINE C. PENN
ST. JOHN, VIRGIN ISLANDS

Like the rest of America, I long ago became tired of Bob Vila telling anyone who would listen how easy it was to install a new bathroom in 30 minutes or less. Now Winn L. Rosch comes along and writes an article telling the world he solved Bob's PC problem in four hours. You two sure are superhumans!

CHARLES E. TYZZER, JR.
INDIANAPOLIS, INDIANA

Purchase Blunder Prevented

Thank you for saving me from making a major purchasing error. I'm in the market for a notebook computer and was seriously considering purchasing the PC Brand 486/SLC until reading Scot Finnie's "torture test" in your January issue (page 128). Keep telling it like it is.

E. R. BAILEY
EAST BRADY, PENNSYLVANIA

OS Debate Rages On

I just opened the January issue and there, in Ed Bott's column, was the perfect summary of what's wrong with Microsoft: "Wait a couple months, and MS-DOS 6.0 will catch up with DR DOS 6.0" ("Get a Clue, MIS! Pay Attention to Next Year's Best-Sellers," page 20). For years, we've been getting the same message from Microsoft. We're tired of waiting, Bill Gates. Better operating systems are out there: If you can't give them to us, we'll go to someone who can. That's why so many of us are defecting to DR DOS or waiting until we can afford machines that run OS/2.

KEITH BACKMAN
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LAN TIMES READERS CHOICE 1992 — 1991, 1990

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Letters

I wholeheartedly agree with Michael Benz (Letters, January, page 29). The OS/2 vs. Windows vs. DOS debate has been decided for me. I purchased an IBM PS/1 486DX with 8MB of RAM and OS/2 installed. After four nightmarish days of SULU (Sudden, Unexplained Lock-Ups) and STUPID (Sudden Terminal Unexplained Peripheral Interface Dysfunction), it was obvious that I had no time or use for OS/2.

I find your articles to be very informative, but the software told me everything that I needed to know. The only question I have about OS/2 is, What's the point?

DON ATKINSON
VICTORVILLE, CALIFORNIA

Psst—Gotta Tip?

Since OS/2 was recognized by *PC/Computing* as a Most Valuable Product, I wonder why no hints, comments, or suggestions on how to use it more effectively appear in your magazine. By virtue of the number of Windows users out there, the cover stories and special issues on Windows 3.1 are probably warranted, but OS/2 2.0's virtual invisibility in *PC/Computing* remains a mystery. Maybe this is a riddle that the Micro Mephisto could work on.

DAVID PAUL MASWICK
GLEN FALLS, NEW YORK

We didn't mean to mystify you and other readers who are looking for coverage of OS/2. Check out "Techniques of the OS/2 Masters" on page 208.

—Marilyn Young

It's All Greek to Intel

Rob Spear's January letter (page 35) was to the point—Intel's Department of Figuring Out Names for New Products was clearly not thinking about what would come after the Pentium.

However, Mr. Spear's analysis of the chip's name was incorrect: *Pent* comes from the Greek word for five, *pente,* not from Latin (though *-ium* derives from Latin). The Greek word for six is *hex,* but I think that *Hexium* would do worse for Intel than *Sexium. Hexium* sounds too much like a chip that's under a curse, and while I personally have cursed a good deal of hardware and software, I wouldn't want to buy anything that sounded like it was already cursed.

DAVID RENSBERGER
VIA PC/CONTACT

Forget the FTC—and Redmond

Both Dvorak and Somerson make some very good comments on the issue of the Federal Trade Commission action against Microsoft ("Does the Rise of Megacompanies Spell the End of Innovation?" January, page 106), but they missed a couple of points. First, breaking up Microsoft could harm the way Microsoft applications and system software work together. Second, Microsoft could move a hundred miles north to Vancouver, Canada, and be outside the FTC's jurisdiction—which would make the entire discussion of a breakup moot. This could be another example of government regulation driving American industry offshore.

ROBERT D. ESTES II
TACOMA, WASHINGTON

Inordinate Ordinance

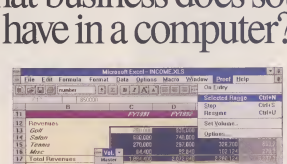
In the article "Getting the Bugs Out" (December 1992, page 304), the author stated that Grace Hopper, a Navy lieutenant, was assigned to the Bureau of Ordinance Computation Project. However, it's more likely that Lieutenant Hopper was assigned to a Bureau of Ordnance project. As a former employee of the Naval Ordnance Laboratory, I used to occasionally get mail addressed to the Naval Ordinance Laboratory. I can assure you that the Navy has never had a Bureau of Ordinance. Ordnance is sometimes used to enforce ordinances, and we have ordinances restricting the ownership and use of ordnance, but the two words aren't interchangeable.

HAROLD PAZOUREK
MT. AIRY, MARYLAND

What a difference an i makes! We apologize for the error and any confusion it may have caused our readers.

—Denise Penrose

What business does sound have in a computer?



For starters, you can increase your productivity when you proof spreadsheets with the new Microsoft Windows Sound System. Just highlight a series of numbers or words on the screen and it will read them back to you. It will even read them aloud as you enter them, if you like. To hear more, turn the page.

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PC Magazine

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Dealer prices may vary, but most dealers sell the BJ-200 at prices under $400. PC MAGAZINE quote reprinted from "PC MAGAZINE," December 22, 1992. Copyright ©1992 Ziff Communications Company. Canon is a registered trademark of Canon Inc. Canon Computer Systems, Inc., 123 E. Paularino Ave., Costa Mesa, CA 92626. For the nearest dealer in Canada, call (800) 387-1241.

Letters

Standouts in the Usability Hall of Fame

In February Letters, we printed examples of products readers love to hate in "Nominees for the Usability Hall of Shame" (page 33). Since well-designed products deserve some recognition, too, here are some of the products readers mentioned in response to "Tell Us What Usability Means to You" (January, page 227).

Any tax program. You don't have to be a CPA, just a pack rat with your papers. Also, Sound Blaster Pro—it covers all the bases, from games to multimedia.

BYRON L. AND DOROTHY E. SMITH
COLORADO SPRINGS, COLORADO

The Norton Commander is as easy to use as a pen. I didn't need the documentation at all. Also, dBASE III brought an intuitive interface to my databases.

FELIX RABINOVICH
WEST HOLLYWOOD, CALIFORNIA

I like my Sony CD-ROM drive. Just load the caddy, and you get flawless performance.

NORMAN W. DAVIS
KENNETH CITY, FLORIDA

Quicken. You don't need a manual.

JAMES V. PATTEN
TENMILE, OREGON

With Quicken, I can always have a balanced checkbook.

JOHN R. MAHONEY
LINCOLN PARK, NEW JERSEY

My NEC 5FG monitor. Everything seems automatic despite the variables.

GORDON J. CALLON
WOLFVILLE, CANADA

Telix communications software. In addition to the logical structure, the package supports many protocols, making it particularly attractive.

ROBERT P. SULLIVAN
VIA PC/CONTACT

WordPerfect 5.1 has a wide range of functions, so you don't have to buy a bunch of add-ons.

WILLIAM A. SELSOR
STROUD, OKLAHOMA

Quattro Pro 4.0 is logically organized and well documented.

ANTON FLEISCHMAN
KIRKLAND, WASHINGTON

My Epson laser printer, for quality output. And XTree for Windows for its ease in keeping everything tidy.

ROBERT A. CLOSE
FRANKTOWN, VIRGINIA

The extra button on my three-button mouse saves time.

EDMUND N. ZULAWSKI
DEPEW, NEW YORK

PC Tools 7.1 has a Windows interface that runs so intuitively that I seldom need to consult reference documentation. Also, my tape backup system has gotten me out of many system crashes—and it's quick and easy to use.

RONALD D. NELSON
NANAIMO, CANADA

Any Windows app from Microsoft. Microsoft labors over the documentation, the products have a fairly consistent look and feel, and functions can be customized. Also, Compaq computers are exceptional because they're "plug and play." If you encounter a problem that the bundled diagnostic utilities and extensive documentation can't solve, you can fall back on customer support.

MARK SCHMIDT
VIA PC/CONTACT

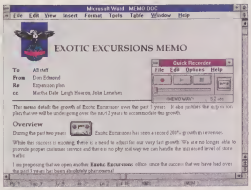
OS/2 is easy and trouble-free, and its abilities are amazing. It runs everything I have, and I can customize it in record time. The onscreen help is terrific. I love it and I'm staying with it.

ELOISE TROSAN
JOHNSTOWN, PENNSYLVANIA

Hewlett-Packard products work well.

ALEXANDER W. WALTER
AURORA, COLORADO

What business does sound have in a computer?



Now you can communicate more effectively by adding your voice, or even music, to documents and presentations. Just record it, drag it and drop it in.

Microsoft Windows Sound System can also recognize and execute spoken commands like *open*, *cut* and *paste*. You can easily create custom commands in any application for the Microsoft Windows operating system. Want to hear something else? Turn the page.

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Letters

President . . . Dvorak?

John C. Dvorak's arguments for breaking up Microsoft demonstrate that he should be president of the United States. He's perfectly qualified. He has the compassion to realize that playing God with other people's property is for their own good. He has the courage to ignore the jobs destroyed, the losses and inconvenience to shareholders, and the adverse impact on computer users. He's the ideal politician. Mr. Dvorak says that only Microsoft needs to be broken up—other companies needn't be afraid. So what's to stop President Dvorak's successors from using his actions as a precedent to break up Lotus, WordPerfect, and eventually any computer company that makes a profit?

HARRY BROWNE
AUSTIN, TEXAS

Like, What's with the Lingo?

I was flipping through the most excellent January issue when I was taken aback by not one, not two, but three reviews that describe products as *cool*. The same word appeared on the front cover. I'm 28 years old and not anal retentive. When did *cool* come back into vogue? You all must be hanging out with Penn Jillette.

DOUG MOHNEY
VIA PC/CONTACT

Kudos for Quicken . . .

I can't help but notice how many of your letters contain gripes about poor service from software companies. Most I've dealt with have been helpful, courteous, and honest.

For instance, several months ago I installed Quicken 5.0 to handle my business accounting. When I read in *PC/Computing* that Quicken 6.0, unlike Version 5.0, could make accounting graphs, I called Intuit. For a mere $10 (including shipping) I had the new Quicken 6.0 in only five working days. I'm impressed with the program and the people behind it.

ANDREW HARTLEY
BATESBURG, SOUTH CAROLINA

. . . and *PC/Computing*

Keep up the good work and continue to raise a little hell.

DAVE LEWIS
NORMAN, OKLAHOMA

Wanted: More Hardware Hand-Me-Downs

In January Letters (page 32), we printed the names of some organizations that would be thrilled to receive hardware hand-me-downs. Since then, we've heard from a few more that could use donations:

MAC Area Agency on Aging

1504 Riverside Dr.
Salisbury, MD 21801
Contact: Lowrence Robinson, (410) 742-0505, (410) 376-3662

A private, nonprofit corporation, the MAC Area Agency on Aging provides services for the elderly. The agency would especially welcome donations of PS/2 or Macintosh computers.

Counterparts

3695 Neol Ave.
Kingmon, AZ 86401-2343
Contact: Dorryl Nelson, (602) 692-6016

Counterparts is an international, cross-cultural, nonprofit association of people who were involved in Southeast Asian military conflicts. The organization could use donations of either 286 or 386 systems.

McKinley High School

800 E. McKinley St.
Baton Rouge, LA 70802
Contact: David C. Bronton, (504) 344-7696

The computer science department at the McKinley High School would be grateful for donations of 286 or 386 machines.

Mail your thoughts to Letters, PC/Computing, *950 Tower Lane, 20th Floor, Foster City, CA 94404; fax us at (415) 578-7029; or contact us via MCI Mail at PCC Editorial or via PC/Contact, our online forum. Letters must be signed and must include a daytime phone number. All letters become the property of* PC/Computing *and will be edited for length and clarity.*

Microsoft Windows Sound System. You'll be hearing a lot about it.

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It's the complete audio solution for your business, with all the hardware and software included. Call (800) 426-9400, Dept. JK8, for a free demo disk that'll bring the Microsoft Windows Sound System to life on your PC. It's the first audio system specifically designed for the Microsoft Windows operating system.*

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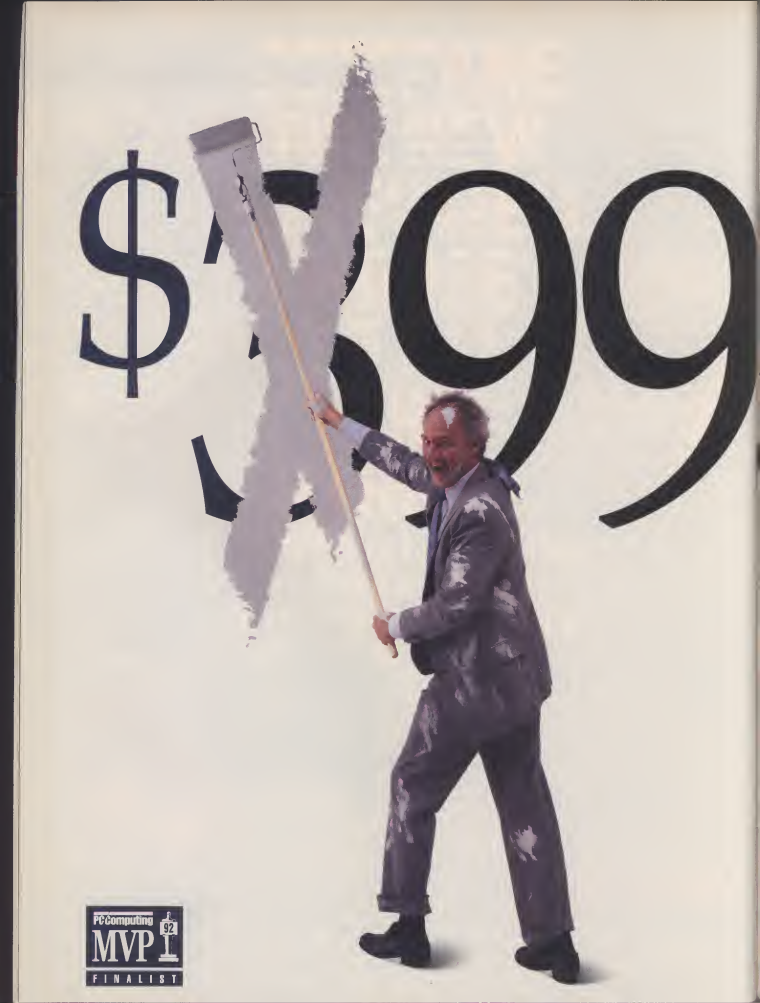
*Requires the Windows operating system 3.1 or later. Demo is on a 3.5-inch high-density disk. Offer good while supplies last. Inside the 50 United States, call (800) 426-9400, Dept. JK8. For information only. In Canada, call (800) 563-9048; outside the United States and Canada, call (206) 936-6961. © 1992 Microsoft Corporation. All rights reserved. Printed in the USA. Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.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- **Monochrome ribbon available for near-laser quality text-only printing**

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Available January 1993

New!

A Mac classic flourishes under Windows . . .

Photoshop: A Quantum Leap for PC Images

ADOBE PHOTOSHOP 2.5 FOR WINDOWS, $895
ADOBE SYSTEMS
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MOUNTAIN VIEW, CA 94039
(800) 833-6687
(415) 961-4400

TAKE YOUR PICK

Why spruce up images one iteration at a time? Photoshop for Windows' Variations feature lets you control hue, saturation, brightness, and contrast for all or part of an image. Use the sliding control shown below in conjunction with the option button to perfect and preview changes before applying them.

TAKE YOUR FAVORITE image-processing software, add cutting-edge features and a touch of refinement, and you've got Adobe Photoshop 2.5 for Windows. Make no mistake, this is a prime-time application, the kind that sets benchmarks for others to measure up to. Think the Mac is the graphics platform of choice for professionals? Give Photoshop for Windows a test spin, and you'll see that image processing is a whole new ball game.

This is high praise for a brand-new Windows program, but then, Adobe is a veteran player. Version 2.5's expanded feature set matches that of the Mac version, while it also emphasizes Windows-specific features such as multiple document interface support and context-sensitive help. The result is an image-processing program that lets you create original art, retouch and color-correct photos and images (in black and white or full color), and color-separate continuous-tone images.

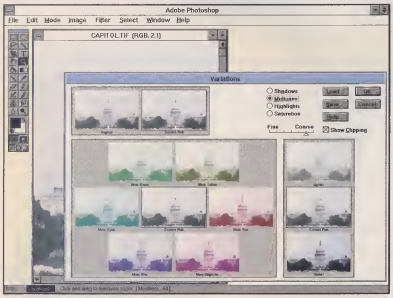
With such sophistication, you might expect Photoshop to be a bit unwieldy, but Adobe deserves credit for providing a usable and tunable interface that keeps Photoshop as simple as possible. The various tool palettes, including paint tools, color palettes, and path and channel palettes, are both floating and collapsible (Adobe calls these *collapsible modeless palettes*) so that your edit screen can be either tidy or sprinkled with palettes. Other helpful interface extras include a prompt line at the bottom of the screen and the ability to have the program beep when it finishes a particular function.

Photoshop's extensive file-format support includes popular formats such as EPS, PCX, BMP, TIFF, and GIF, along with slightly more exotic formats such as Kodak Photo CD, JPEG, Pixar, and Scitex CT. If you plan to use or share Photoshop across platforms, the binary-compatible file format in both the Mac and Windows versions is a major benefit in any production environment.

Besides importing files, you can create artwork from scratch or scan material directly into Photoshop. Photoshop for Windows is TWAIN-compliant, so you can use any scanner that supports TWAIN to directly scan in images. A plug-in kit for development of third-party plug-ins means that soon there will likely be plug-in scanner drivers either for products that don't support TWAIN or to address specific features of new scanners.

Photoshop provides plenty of tools for creating original art, including an unlimited number of custom brushes, tools for painting with textures or patterns, and a rubber stamp for cloning and reproducing elements of an image. You get the usual drawing tools (pencil, brush, airbrush, text, and so on), along with some functional options like definable soft-edge brushes, Wacom tablet support, and brush widths of up to 999 pixels. Photoshop is not first and foremost a painting and drawing tool, but the controls and tools included are top notch, and creating high-quality art is as easy as retouching an image.

As strong as Photoshop's image-creation and image-capture tools are, however, no one



is going to shell out $895 just to create illustrations. The program's strongest features fall in the area of image editing, transformation, and output.

Any image can be transformed by rotating, stretching, skewing, or distorting, and a generous collection of filters (35 come standard) covers a range of effects, from sharpening and softening to special effects like mosaic, tiles, pointillize, and wave. You can define your own custom filters or obtain third-party special filters (again, via the plug-in interface). A new feature in Photoshop is Dodge and Burn, which mimics the traditional photographer's method of controlling an exposure by lightening or darkening selective parts of an image. As with many other Photoshop functions, keyboard shortcuts for Dodge and Burn speed up the process; for example, holding down the Alt key lets you toggle between the two functions.

Photoshop has a wide range of tools for selecting part or all of an image. These include lasso, magic wand, and rectangular and elliptical tools; a quick-mask tool lets you create or edit simple temporary masks.

Color Your World

Photoshop's output control is both comprehensive and precise. First, you can calibrate everything from your monitor to your output device. Once you set the calibration (a simple procedure), you can use just about any leading color system with confidence, including Pantone (the United States printing-ink standard), Toyo (the Japanese standard), or Focoltone (the United Kingdom standard). Photoshop also supports the CIE LAB color model, which offers device-independent color output to any PostScript Level 2 device.

You can edit any image in a variety of modes and quickly switch between bitmap, grayscale, duotone, and RGB and CMYK color modes. The capacity for onscreen CMYK editing is convenient. Anyone involved in prepress work will appreciate the precision of onscreen CMYK editing as well as the time saved by not having to convert a CMYK image into RGB for editing.

Photoshop for Windows' output controls apply to just about every possible situation. You can create high-quality color separations and adjust the output for different paper stock and printing devices. You can also control such details as under-color removal, ink densities, and gray-component replacement. And you can create duotone, tritone, or quadtone separations, which are attractive but less expensive to print than four-color separations.

The features we've covered so far only hints at what you can do with Photoshop. In addition, the Channels feature lets you edit and view any combination of color plates onscreen. You can correct color for an individual channel or any portion of an image you're working with.

Image-editing and image-manipulation programs with this much power often burden system resources, but Photoshop is fairly sprightly. The peppy performance stems from Adobe's directed effort to make Photoshop image-editing sessions efficient. For instance, a tiled redraw doesn't require the entire screen to redraw when only a small section of an image is edited.

Downsides

The bad news? Even though Photoshop is impressive, we can still suggest a few improvements. The program could use previews before you initiate a filter, a feature some of Photoshop's competitors offer, and the text tool could be more powerful. The program also lacks the automatic, one-step straightening and cropping of color scans that PhotoFinish offers. And there is only a single-level undo command, although the revert function undoes all changes since the last save.

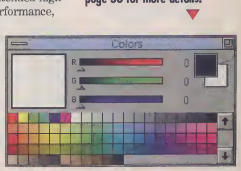
All in all, these are fairly minor quibbles. Photoshop includes most of the best parts of competing products, along with extended high-end prepress capabilities, good performance, extendability, and cross-platform support. Business users with modest graphics needs might be better served with less expensive alternatives, such as ZSoft's PhotoFinish or Micrografx's PhotoMagic, but graphics professionals won't need any convincing. This is the real thing.

JON PEPPER

RAZZLE-DAZZLE

As the screen above shows, Photoshop 2.5 for Windows is no stronger to floshy colors.

Photoshop's color controls ore superior, and they're very flexible. You con edit ony image in o voriety of modes and switch between, say, RGB (see below) ond CMYK color modes. You con creote high-quality color seporotions ond use duotone, tritone, or quodtone seporotions (which ore cheoper to output than four-color seporotions). And using custom brushes (shown above), you can creote and reuse speciol effects. See the Guided Tour on page 38 for more detoils.



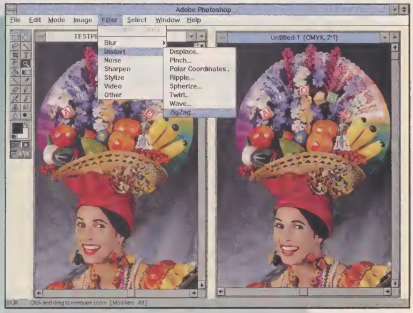
GUIDED TOUR

Photoshop for Windows' Filters and Effects Give You Infinite Control

FILTERS

The Toolbar

In addition to stondard tools such as text and line-drawing tools, Photoshop's toolbar offers taols far resizing and repositioning imoges. For example, you can zoom and pon imoges with the magnifying glass taal, which is how we enlarged the images on this poge so thot they filled their respective Windows.



Choosing a Filter

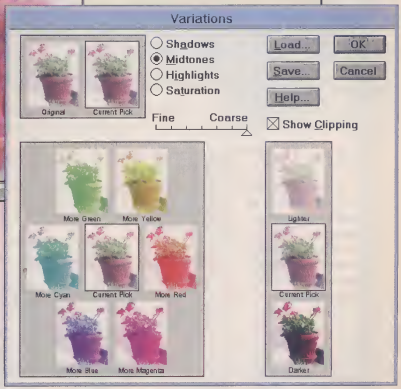
Photoshop's Filter menu lets you distort images subtly or in more pronounced woys. Above, we've chosen to opply o dromatic ZigZag effect to the image on the right side of the screen.

Filter Results

You can see the effect of the ZigZag filter on the right side of the screen at left. We tested this filter on a 386/33 with only 4MB of RAM to see the effect of lesser hordware, and it toak nearly 20 minutes to camplete. This is why we recommend o 486 with ot least 8MB of RAM if you'll be warking with filters and large, 24-bit images. With onything less, your use of filters will qualify as bana fide caffee breaks.

Custom Brushes

You'll probably be happy with Photoshop's custom brushes (shown at right), but you can also design and store your own palettes. For opaque brush effects, set Opacity to 100 percent.



A Closer Look at Variations

The Variations dialog box at right shows in more detail than on page 36 how subtle effects can fundamentally alter the look of a picture and how you can see multiple effects applied at once.

One item on our wish list for Photoshop: You should be able to preview the effects of filters in the same way you can preview effects like the ones seen at right. When working with 24-bit images, filters, and effects, you can't have enough preview capabilities.

Insight's Loaded Multimedia System—The Best We've Seen

CHEAP COLOR SCANNER

Get the convenience and image quality of a flatbed color scanner for the price of a handheld version. Plustek's (800-685-8088) $780 24-bit ScanPlus Color 6000 sheet-fed scanner turns documents into editable image and text files on your PC.

Not much bigger than a notebook computer, the ScanPlus comes with an adapter card, cables, Picture Publisher LE imaging software, and the WordScan optical character recognition package—everything you need to scan in 600-dot-per-inch color images and text documents. Installing the ScanPlus could be easier (it entails manually copying device drivers and editing CONFIG.SYS), but once running, it's a cinch to use. WENDY TAYLOR

BUYING A WHOLE new system just to add multimedia capabilities is silly, especially when you consider all the great multimedia upgrade kits on the market.

But if you're ready to buy a new PC anyway, you'd be hard-pressed to find a better multimedia PC than Insight's new Multimedia System. The 66MHz DX2 system we evaluated is megafast, and it includes a great bundle of CD-ROM software and all the expansion options you could imagine.

Pentium Ready

We give a strong thumbs up to the 486DX2-66MHz VESA VL-Bus Multimedia System's 238-pin upgrade socket. That's what you'll need if you ever upgrade the machine to Intel's forthcoming Pentium-based OverDrive chip, code-named the P24T. And there's plenty of room for additional storage and memory, too. The roomy tower design includes seven drive bays.

The price-to-performance ratio is perfection: Just $3,999 buys you a whopping configuration: 8MB of RAM, a 256K cache, a 245MB Seagate IDE drive, a 15-inch NEC Multisync monitor, a double-speed CD-ROM drive, sound circuitry, a pair of speakers, and a graphics adapter that can display resolutions of up to 1,024 by 768 pixels with 256 colors.

The system's outstanding performance reflects its bus design: The graphics adapter and the IDE circuitry both work through the local bus at speeds of up to 33MHz instead of through the typical 8MHz ISA bus. Insight has installed the STB Powergraph VL-24 graphics card into one of its two VESA-standard local-bus sockets. The other VESA socket contains Insight's IDE disk and floppy controller card.

Extras Galore

Better still, this system comes with a ton of free software—including DOS 5.0, Windows 3.1, Ontrack's Dr. Solomon's Anti-Virus Software, and Stacker 2.0 data-compression software. Four CD-ROM packages also come with the machine: Microsoft's Cinemania (an interactive guide to thousands of movies), the 1992 Guinness Disc of Records, the Sherlock Holmes Detective game, and the 1992 Toolworks Encyclopedia. These titles won't help you stomp business competitors, but they're much better than what's included with competitive multimedia systems. The Toolworks Encyclopedia is the closest thing to a businessfocused CD in Insight's collection, and Cinemania beats video review books hands down.

Do you *need* a multimedia PC? The answer is probably not. Because precious few multimedia-based business applications are on the market, it's far more important to have a PC that is well equipped to run the business applications you have today.

But *wanting* a multimedia PC is a different story, what with all the interesting, well-designed CD-ROM–based games and reference tools hitting the market. We're constantly impressed with the high quality of CD-ROM titles. Insight's system gives you excellent multimedia capabilities. We highly recommend it.

GINA SMITH

INSIGHT 486DX2-66MHZ VESA VL-BUS MULTIMEDIA SYSTEM, $3,999
INSIGHT DISTRIBUTION NETWORK, 1912 W. 4TH ST.
TEMPE, AZ 85281; (800) 755-9628, (602) 902-1010

The Insight's speed reflects its VESA VL-Bus design. Those are speakers attached to the monitor.

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And he's not the only expert who has doubts about QEMM: "more and more contrived" (*PC/Computing*),"a potentially risky procedure", "serious disk performance problems" and ". . . during a QEMM-386 install, a PC would wander off to never-never land. That almost never happened with 386MAX." (*PC Magazine*).

Speaking of 386MAX,® we suggest you try it instead. Because 386MAX lets you run Windows with unmatched reliability and, as *BYTE* puts it, "seems to work flawlessly." And that can mean avoiding a lot of disastrous crashes.

Plus, 386MAX installs automatically and comes loaded with Windows-enhancing features like TSR instancing, Virtual High DOS and more.

BYTE sums it up perfectly: "The best of these programs is 386MAX (or BlueMAX™ for a PS/2). It's so easy to use and offers such significant benefits that it should be part of every . . . system."

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RAM PAGEFRAME BIOS MEMORY VGA MOUSE TSRs HIGH DOS EGA INITIALIZE DPMI MODEMS 640K FAX BOARD 386SX

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System Requirements: Any 386, 386SX, 486 or 486SX PC or PS/2, min. 256K of extended memory, DOS 3.0 or higher, and hard disk drive (386MAX also supports 286 machines with Shadow RAM, or any PC with EMS 4.0 hardware with 256K memory. Feature availability and memory recovery may vary on these systems.)

The Light Bulb 1879

Aspirin 1899

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The Refrigerator 1913

NEC MultiSpin CD-ROM Reader 1992

der how you ever lived without them.

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All of our readers support Kodak's Multisession Photo CD™ technology, so you can view photographs on CD and work with those images on your computer. All are SCSI 2 compatible, which increases compatibility across multiple platforms. And both the MultiSpin 74 and 84 have a 256 KB continuous flow cache that allows them to transfer encyclopedias of data at high speeds and play back video without any pauses in motion. And the MultiSpin 38 gives you the power of portability. Best of all, they all come with a two-year warranty.

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What's more, all of them are QuickTime™ compatible and meet the Multimedia PC (MPC) standards for Multimedia computing. Once you check out the high-performance CD-ROM readers from the pioneers of MultiSpin technology, you'll find everything else about as primitive as traveling by horse and buggy. To find out more, call 1-800-NEC-INFO (in Canada 1-800-343-4418). Or, via fax, call NEC FastFacts™ at 1-800-366-0476, request #23766.

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NEC

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Canon's BJC-800 Costs Less and Prints Faster than HP's PaintJet

PAPER MATTERS

With color printers, output is everything, and the paper you use has a dramatic effect on the look of output.

As the two output samples here show, the quality of the Canon BubbleJet's output on plain paper (top) isn't as good as it is on coated paper (bottom). Of course, you must consider the usual cost issue: Coated paper costs about 10 percent more than copier paper (see page 46 for Tektronix's color output).

CANON BJC-800,
$2,795
CANON COMPUTER SYSTEMS
123 E. PALULARINO AVE
COSTA MESA, CA 92628
(800) 848-4123

HEWLETT-PACKARD'S PaintJet XL300 set unheard of print-quality standards for color ink jet printing. Now with its BJC-800, Canon sets a new low price. The $2,795 BJC-800 gives you the plain-paper convenience of BubbleJet technology for $700 less than the $3,495 PaintJet XL300.

How does Canon get its price so low? Like most ink jet and BubbleJet printers, the BJC-800 follows a host-based imaging model, which means it uses the computer to rasterize page data. The printer doesn't have a processor or memory, so you don't pay for the extra hardware. This makes ink jet technology very affordable when compared to other color printing technologies.

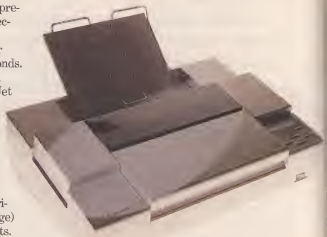
Since document processing occurs in the computer, the faster your CPU, the faster printing is—an important consideration if you're running a 286 with only 2MB of RAM. Canon recommends 4MB, and we recommend at least a 386DX, not only for fast printing but also for faster processing of color files.

The BJC-800 is fast—for color BubbleJet technology. Our three-page PowerPoint presentation printed in 15 minutes and 37 seconds, but the more expensive QMS ColorScript 210—a thermal wax-transfer printer—took only 4 minutes and 21 seconds. A color bit-mapped image that printed in 5 minutes and 50 seconds on HP's PaintJet XL300 took the BJC-800 only 4 minutes to print from our 33MHz 486DX test machine. The PaintJet XL300 trades off speed for print quality by heating the paper as it passes through. This speeds up ink drying and reduces the banding (horizontal or vertical lines in the image) commonly seen in ink jet printouts.

Documents printed on the BJC-800 do exhibit some banding—especially when compared with those printed on the PaintJet XL300—but overall print quality is very good. In addition to an extremely quiet operation, ink jet printers print on plain paper. Colors appear slightly washed-out on plain paper but are acceptable for professional purposes, especially if you're adding one color page to an otherwise monochromatic report. Of course, colors appear much brighter and more vibrant when printed on coated paper (see the output samples to the left).

We do have one complaint: In normal printing mode, some colors, especially purple and green, appear very dark—almost black. The driver we looked at had no color-correction capability or intensity adjustment, although both should be available by the time you read this. Text quality was very good; the BJC-800 offers 360-dot-per-inch resolution. Although suitable for business use, 360 dpi is not as black or as crisp as laser-printed text. If text output quality is your overwhelming priority, better solutions are available.

For print jobs requiring a mix of black-and-white text pages with colored graphics pages, the BJC-800 is your best bet. You can find it for around $1,800, while the PaintJet XL300 is on the street for around $2,300. The BJC-800 has the print quality and speed to handle your most demanding print chores. **CYNDY BATES**



Canon's $2,795 BJC-800 color ink jet prints on plain paper and tested fast—far a color printer.

"my dog ate it"

"i lost the phone number"

"i can't remember everything"

"no one told me"

"i was stuck in traffic"

"what meeting?"

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Stop making excuses. Now anyone can get organized with new PackRat 5.0. It's the only complete information manager that makes Windows™ easier to use – so you and your computer can become more productive. For a free brochure call 1-800-PACKRAT, x F041.

POLARIS SOFTWARE

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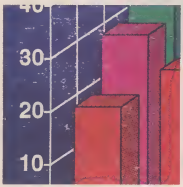
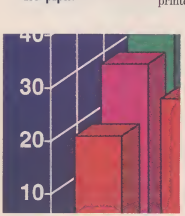
Tektronix's Color Printer Offers Mixed Results with Plain Paper

OUTPUT REVISITED
Like Canon's BubbleJet (see page 44), Tektronix's Phaser 200i is finicky about printing on truly plain paper. Output on plain copier paper (top) is extremely spotty and uneven. Your best bet is to go with coated, laser-quality paper (bottom) for better-looking output.

For purposes of comparison, Tektronix's plain copier paper costs 10 cents less per page than the company's coated laser paper.





PHASER 200i $5,995
TEKTRONIX
P.O. BOX 1000
MS 63-583
WILSONVILLE, OR 97070
(800) 835-6100
(503) 682-7377

YOU CAN'T BEAT thermal-wax printing for its vibrant colors and affordable price. But thermal wax requires glossy, clay-coated paper, which doesn't blend in well when mixed with the plain paper used for black-and-white text. Tektronix has a cure for the problem with its Phaser 200i. This $5,995 thermal-wax printer prints business-quality graphics on plain paper—sort of.

The secret to its plain-paper printing is a special transfer roll. The ColorCoat roll lays down a thin primer on the paper where the image will be, providing a smooth surface for the wax. The three colors (cyan, magenta, and yellow) are then applied on top of the coating, leaving plain paper where the color doesn't appear.

The Phaser 200i prints on finer grades of laser printer paper, but print quality on copier paper is abysmal—the surface is too rough to properly absorb the colored wax. So even though the Phaser 200i accepts a standard grade of paper that can be used with other laser or ink jet printers, you'll still have to explain to your boss why the color printer needs a special, higher grade of paper.

Even if you're happy printing with a three-color roll on glossy paper, you should still consider the Phaser 200i. It's blisteringly fast, with a rated engine speed of 2 pages per minute. That may not sound fast compared to a laser, but a typical thermal wax-transfer printer is rated at 2 *minutes* per *page*.

The QMS ColorScript 210, which is rated at 1 page per minute, printed three pages of a PowerPoint presentation in 4 minutes and 35 seconds. Using glossy paper and a three-color ribbon roll like the ColorScript's, the Phaser 200i took only 2 minutes and 13 seconds; transparencies took only a few seconds longer. The ColorCoat roll for plain paper, which has an extra panel, took longer to print (3 minutes and 7 seconds), but was still faster than the ColorScript.

As noted, the print quality on plain copier paper just isn't business quality. Documents look worn and have white spots where the wax missed and unevenly colored patches. However, print quality on Tektronix's laser-bond paper was excellent, as it was on the glossy paper.

The Phaser 200i can switch between ColorCoat, three-color, and four-color rolls, but you won't do it often. Unlike some printers, the Phaser 200i doesn't have a tray for the transfer roll, which makes switching between rolls an onerous task. Wrinkling a roll is guaranteed, and dropping one is equally likely.

We'd also like to see Tektronix drop the price—$5,995 isn't out of the thermal-wax price range, but it is at the high end. A price closer to $5,000 would make it a better value.

But you do get a lot of bang for the buck. The Phaser 200i includes PostScript Level 2; a 24MHz RISC processor; 6MB of RAM; 39 Adobe fonts; parallel, serial, and AppleTalk ports; and a SCSI port for a hard disk (for extra font storage). An optional internal ethernet card is available for $695, making this an ideal printer for networked environments.

If you insist on stealing paper from the copier even for color printing, you'll be happier with a solid ink or phase-change printer like Tektronix's Phaser III PXi. But if obtaining laser printer or clay-coated paper isn't a problem, the Phaser 200i has the speed and versatility to get the job done.

CYNDY BATES

Tektronix's Phaser 200i thermal-wax printer produces professional output on finer grades of laser paper.

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Robert D. Pinson, TV Production

Cynthia Krol, Westlake Village, CA

Timothy J McManus, Minneapolis, Minnesota

Susan Yeagley Sullivan San Diego, CA

Robert D. Pinson, Miami, FL

These people are all real QuickBooks users. (Thanks for all your comments and photos!)

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New!

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Version 6.0 comes with a screen saver, o personal message center to remind you of scheduled events, and a background-printing optimizer. It's also bundled with Memory Miser 386, which helps reduce Software Corousel's usoge of lower memory to os little os 4K.

Windows is greot if you hove high-end hordwore, but for flexible progrom switching on your orgonization's lesser hardwore, Software Corousel does it best.

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LAPLINK ISN'T JUST a utility anymore—it's a brand-new approach to sharing data. With the release of the $169.95 LapLink V (including serial and parallel cables), users of the already-popular LapLink Pro get such useful features as peer-to-peer file transfers over Novell networks, improved performance under Windows, and incredibly smart directory-synchronization features.

LapLink's new interface takes cues from Windows apps, offering a toolbar and drag-and-drop features. To copy files, just grab them with the mouse, drag the group, and drop it on the destination directory.

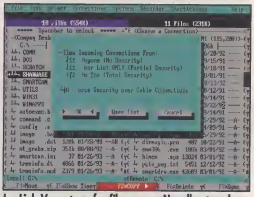
In addition to the file-transfer methods already supported—serial or parallel cable and modems—LapLink V supports file transfer across a Novell network (NetWare Versions 2.2 and 3.11). In the past, if you added new users to a network, you would configure their machines in your office using LapLink Pro and a parallel cable. Now you can configure workstations at new users' sites, connect them to the network, and then transfer all of the necessary files at 8MB or more per minute using a simple Clone Drive command. This feature also makes software distribution and updating across a network easier than ever.

Users of LapLink Pro complained of slow file-transfer performance under Windows. With the addition of some very smart Windows communications drivers, LapLink V users will see performance under Windows pick up smartly. The included communications drivers completely replace the Windows COMM.DRV file to provide throughput of up to 115,200 bits per second over a serial connection.

LapLink makes synchronizing directories between different PCs more flexible. The new Synchronize Directory feature lets you make files in two directories identical, while the Clone Directory command mentioned above re-creates a source directory on the target drive. Finally, the Refresh Directory command copies only the files from the source directory that exist on the target and are newer than the files on the target.

Users of earlier LapLink versions can upgrade for $49.95 (software only) or $64.95 (software and cable). Should you shell out the money for LapLink V? If you need to move or copy files between PCs using networks, modems, or cables, LapLink V is a bargain and a must-have product.

DALE LEWALLEN



LapLink V can transfer files across Novell networks and now performs much faster transfers.

Umax's ScanOffice Offers Single-Source Publishing

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NEED ONE PACKAGE that converts your Windows PC into a graphics and publishing workshop? Priced at just under $1,000, Umax ScanOffice combines a 600 dot-per-inch grayscale flatbed scanner and several first-rate Windows packages, including Microsoft Publisher, ExperVision's TypeReader OCR software, and limited editions of Micrografx Draw and Picture Publisher. It's all you need to create professional newsletters, reports, and other black-and-white documents on a PC.

ScanOffice effortlessly scans text and graphics. Fire up TypeReader in Windows, slap printed reports or letters onto the scanner, and it's a heavy-duty OCR station. Switch to Picture Publisher, replace the text with a photo, and it's a grayscale graphics scanner. Microsoft Publisher puts *(continued on page 58)*

We're Playing Your Song!

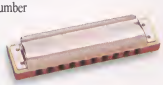
Cou
intel inside

If Gateway 2000 was a record, what would we sound like? Music to your ears!

Those Old-Time Country Values
by The Low Overheads

Our album would kick off with some great Country tunes because, after all, we're the original country PC company with the low-overhead prices. We're located

in the heartland of America where our factory is bordered by corn and bean fields. KSUX country radio, the Super Pig, is the number one station in these parts (no fooling). Gateway folks are mostly midwest born and raised, and it shows in our quality workmanship and in the friendly, down-home way we treat our customers. We'll bend over backwards to please you. When you buy from Gateway, you get the best price, quality and service. That's a value nobody can beat.



Gimme the Good Stuff –
by Hammer and the Boys

This song is dedicated to everybody who's tired of new technology becoming affordable only after it's upstaged by something better. At Gateway, we offer the latest, newfangled technology at homespun prices.

Baby, Let Me Baby You
by The Support Group

Every Gateway 2000 system comes with excellent after-the-sale support. You get a **30-day money-back guarantee**. If you don't like your system, send it back within 30 days for a refund. All systems come with a **one-year limited warranty** and telephone **technical support** for the life of the system from our award-winning tech department. We received *PC World's* World Class Award in 1992 for best service and support in the hardware category. And in a February 1993 survey, *PC Magazine* readers once again gave Gateway an excellent rating for service and reliability. You also get a **lifetime BBS membership** for additional technical support and online forums.

To serve you better, we've hired and trained over 500 new people for customer service, technical support, sales and manufacturing in the past five months, bringing our total number of employees to over 1,900.

We offer **on-site service** to most locations in the country (factory service only for notebooks). **Replacement parts** leave our factory as quickly as possible; we pay overnight shipping. Plus we now have **interactive documentation** on desktop systems with pictures and text right on your hard drive (in addition to comprehensive hardware and software manuals).

We make it easy for you to buy a Gateway PC, too, with convenient payment options including major credit cards and C.O.D. terms. Net 30-day terms and leasing options are also available to qualified commercial customers. All this *and* your great-looking Gateway PC comes in our distinctive, country cow-spotted box!

GATEWAY2000

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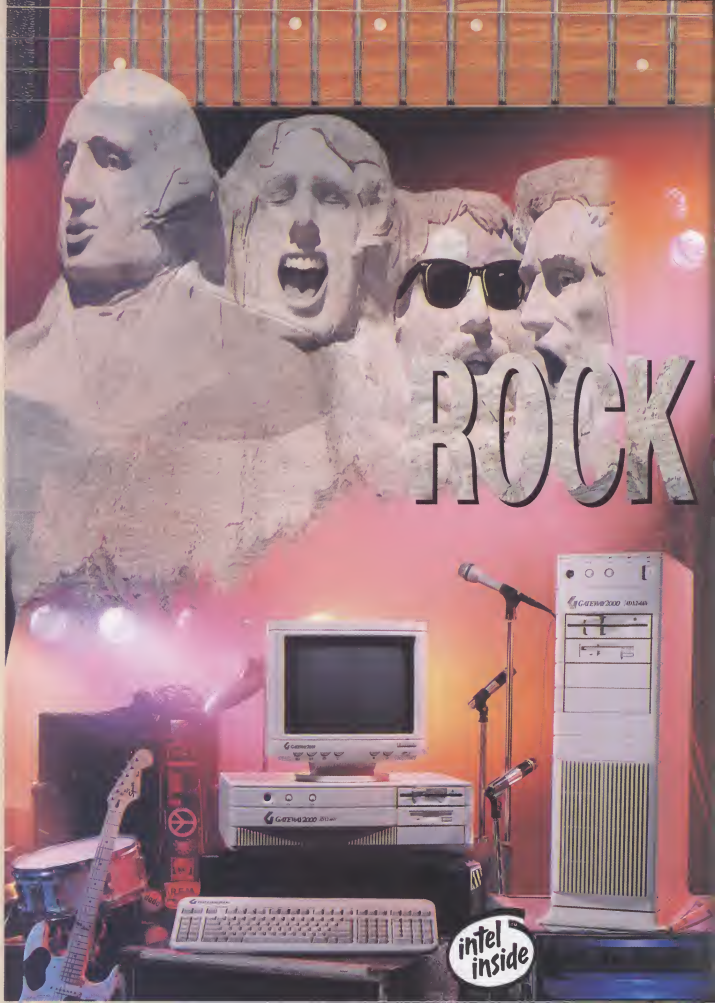
◀ *Gateway's 4SX-33 makes a mighty-fine Windows machine!*

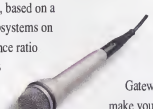

ROCK
intel inside

We Got the Goods – *by The Systematics*

Gateway's album would continue with some heart-pounding rock 'n roll cuts because our systems are definitely pure rock. They're cool-looking, hot-performing, high-energy machines – at some sweet prices. There's a model that's perfect for you.

Megahertz So Good – *by Pup and the Cells*

Gateway's mini-desktop systems – 3SX-33, 4SX-33 and 4DX-33 – are petite but plenty powerful, based on a integrated design that incorporates many subsystems on the motherboard for the best price-performance ratio All mini desktop systems include: 4 to 8MB RAM; a large and fast hard drive, operating on the local bus in 486 models for even faster drive performance; a fast video chipset with 1MB; a brilliant, crisp display from the standard 14-inch CrystalScan non-interlaced color monitor; and more available expansion slots than you find in most small-footprint PCs. The combination of these features makes a cool Windows machine for an unbeatable price.



So You Wanta Fly? – *by The Screamin' Vs*

Power users, pick up the phone and order a Gateway 2000 VESA local bus 486 machine right now. You'll never regret it. With our 4DX2-50V or 4DX2-66V models, you get screaming PC performance. We put ATI's Graphics Ultra Pro video card with 1MB VRAM on our VESA local bus for results that are simply awesome! Plus these systems have a hefty 8MB RAM with cache, and hard-rockin' hard drives running on the local bus. Extra VESA local bus expansion slots, too. You get a 15-inch flat, square CrystalScan color monitor – our top-of-the-line – and more choices of cool application software than you'll find anywhere else.

We custom-build each Gateway 2000 computer to your order. We'll gladly provide you with a quote on a special configuration. Call our sales department!

Big Bandwidth Boogie – *by The Gates*

If you're looking for the 32-bit power of an EISA system, we offer three models – 4DX-33E, 4DX2-50E and 4DX2-66E. All models include: 8MB RAM with 256K cache; a very large, very fast SCSI hard drive; 32-bit EISA SCSI controller; and a standard tower case. Please call for details and prices on models not listed on our price page.

Workin' Up Some New Riffs – *by The Harmonics*

This one's our theme song. At Gateway, we're always looking for ways to make your PC easier and more fun to use. For example, we now install a Mach 32 video driver icon in your Windows control panel so you can change your video resolution quickly and easily.

All Gateway systems go through extensive compatibility testing to ensure flawless performance with all products from major software developers and peripherals manufacturers.

GATEWAY2000

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◀ *According to* PC World, *"(Gateway 2000's 4DX2-66V is) by far the fastest machine we've ever tested!"*

GATEWAY 2000
ALL THAT
WORD
WINDOWS
WORD
intel inside

Windows to the Other Side – *by Tommy Gee*

Gateway's album would also include jazz favorites because we offer a complete line of software and peripherals to make your system extra cool.

Software Improv – *by Good Vibes*

All Gateway systems come with some very hip software, all pre-installed and ready to run the moment your PC arrives. With mini desktop, desktop and tower systems that include "choice of application software," you get to pick one of the following applications, all latest versions:

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- Microsoft Word for Windows™
- Microsoft Word and Bookshelf 92® CD
- Microsoft PowerPoint for Windows™
- Microsoft Project for Windows™
- The MS Entrepreneur Pack (Works,™ Publisher,™ Money,™ and games)
- Borland Paradox® for Windows™
- The Windows Programmer Pack (MS Quick C,™ Visual Basic and more)
- Upgrade to Microsoft Office™ for $175

All Gateway desktop systems also come with Cool Tools for DOS, a diagnostic and utilities package including QA Plus™ from Diagsoft, Central Point® Anti-Virus and more.

Connectivity – *by The Local Area Group*

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- Other Software

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The software and peripherals listed here are sold only with the purchase of a system. For details on our complete line of extras for Gateway customers, call direct to our special add-on components division: ***800-846-2080.***

◀ *Gateway's 4DX-33V is shown here with Windows Sound System components, the CD-ROM kit and optional speakers. Call for details on this system.*

GATEWAY 2000

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Gateway 2000's Hit Parade

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- 33MHz 386SX Intel® Processor
- 4MB RAM
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- 80MB 17ms IDE Hard Drive
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan™ 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey™ Keyboard
- MS-DOS® Windows™ & Mouse
- Cool Tools for DOS
- MS Works for Windows™ 2.0

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4SX-33

- 33MHz 486SX Intel Processor
- 4MB RAM
- 5.25" & 3.5" Diskette Drives
- 170MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel OverDrive Socket
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- MS-DOS, Windows & Mouse
- Cool Tools for DOS
- MS Works for Windows 2.0

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- 33MHz 486DX Intel Processor
- 8MB RAM, 64K Cache
- 5.25" & 3.5" Diskette Drives
- 250MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel OverDrive Socket
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 124-Key AnyKey Keyboard
- MS-DOS, Windows & Mouse
- Cool Tools for DOS
- MS Works for Windows 2.0

$1995

4SX-33V

- 33MHz 486SX Intel Processor
- 8MB RAM, 64K Cache
- 5.25" & 3.5" Diskette Drives
- 250MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel OverDrive Socket
- VLB ATI Ultra Pro with 1MB VRAM
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- Desktop Case (Tower Upgrade)
- 8 16-Bit ISA Slots, 2 with 32-Bit VLB
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- MS-DOS, Windows & Mouse
- Cool Tools for DOS
- Choice of Application Software

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- 8MB RAM, 64K Cache
- 5.25" & 3.5" Diskette Drives
- 250MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel OverDrive Socket
- VLB ATI Ultra Pro with 1MB VRAM
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade)
- 8 16-Bit ISA Slots, 2 with 32-Bit VLB
- 124-Key AnyKey Keyboard
- MS-DOS, Windows & Mouse
- Cool Tools for DOS
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- 66MHz 486DX2 Intel Processor
- 8MB RAM, 256K Cache
- 3.5" Diskette Drive **AND CD-ROM Drive** ◀
- 340MB 13ms IDE Hard Drive
- Local Bus IDE Interface
- Intel OverDrive Socket
- VLB ATI Ultra Pro with 1MB VRAM
- 15" Color CrystalScan 1572FS
- Desktop Case (Tower Upgrade)
- 8 16-Bit ISA Slots, 2 with 32-Bit VLB
- 124-Key AnyKey Keyboard
- MS-DOS, Windows & Mouse
- Cool Tools for DOS
- Choice of Application Software

$2995

4DX2-66E

- 66MHz 486DX2 Intel Processor
- 8MB RAM, 256K Cache
- 5.25" & 3.5" Diskette Drives
- 500MB 11ms SCSI Hard Drive
- 32-Bit EISA SCSI Controller
- Intel OverDrive Socket
- Windows Accelerated Video w/ 1MB DRAM
- 14" Color CrystalScan 1024NI
- Tower Case
- 8 32-Bit EISA Slots
- 124-Key AnyKey Keyboard
- MS-DOS, Windows & Mouse
- Cool Tools for DOS
- Choice of Application Software

$3495

Software Options

With systems that include "choice of application software," pick one from this selection:

- Microsoft Excel for Windows
- Microsoft Word for Windows
- Microsoft Word and Bookshelf 92 CD
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- Microsoft Project for Windows
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- Borland Paradox for Windows
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- Hundreds of professionally-designed, ready-to-print layouts
- Thousands of special text effects, plus backgrounds and borders
- 22 fonts with adjustable point size and spacing
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AUTODESK

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Circle 118 on reader service card.

GO EASY ON YOUR EYES

When a monitor performs poorly, it can cause vision problems, fatigue, and headaches. Want to know if yours is in condition?

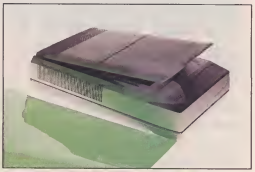
The new version of DisplayMate Professional from Sonera Technologies (800-932-6323, 908-747-6886) is a $249 package of software tests—more than 200 visual test patterns and more than 100 diagnostic tests—designed to you help set up, evaluate, and adjust monitors and video adapters for peak performance.

The program measures resolution, color, screen distortion, scan frequency, interlacing, refresh rate, dot clock rate, and required video bandwidth for all modes. DisplayMate isn't glamorous, but it's smart enough for the job. BRUCE SCHNEIER

SCANOFFICE, *from page 48*
the text and graphics together in a single document. ScanOffice also includes a copy of Micrografx Draw with more than 70 scalable clip-art files for illustrating documents.

The core of the ScanOffice package is Umax's OA-1 scanner, an 8-bit SCSI device that scans up to 256 levels of gray. It handles resolutions above the norm—up to 600 dpi vertically (though only the standard 300 horizontally, which the software interpolates to 600 dpi). Its 8½-by-14-inch scanning window is larger than many entry-level flatbed scanners, including the *PC/Computing* MVP-winning Hewlett-Packard ScanJet IIp. Like the ScanJet IIp, Umax's scanner is TWAIN compliant.

Unlike HP's award-winning scanner, however, Umax's installation can be thorny. Its default interrupt request settings can conflict with network cards, and there is no utility to check this out. It also lacks the SCSI address utility that makes HP's scanner so easy to configure.



ScanOffice has an 8½-by-14-inch scanning window—larger than that on HP's ScanJet IIP.

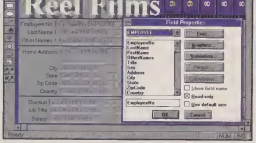
These quibbles aside, if you need to get started on graphics, scanning, OCR, and desktop publishing, ScanOffice provides all you need in one box. MATTHEW LAKE

Superbase 2.0 Isn't Cheap, but Its Windows Interface Has Dramatically Improved

SUPERBASE 2.0, $
SOFTWARE PUBLISHING CORP.
3165 KIFER RD.
P.O. BOX 54983
SANTA CLARA, CA 95056
(800) 447-7991

IT MAY NOT be the first Windows database that comes to mind, but Software Publishing's Superbase was for a long time the only Windows relational database with a programming language. Version 2.0 should earn more recognition.

Superbase has abandoned its nonstandard menus and dialog boxes. Radically redesigned, the program now complies with Windows conventions and is far easier to use. A new customizable icon bar gives Superbase the look of most Windows applications.



Double-click on an object in Superbase 2.0 for a dialog box that lets you set properties for that field.

The form designer lets you use sectioned boxes (3-D areas that segregate groups of fields) and shadows, and also lets you align objects. Double-clicking on an object brings up a dialog box of options and settings for each field. Also new are scrolling "detail blocks" that display, for example, order-entry information such as a customer name and address, in a scrollable region of the screen.

Superbase can now directly read and write dBASE II, III, and IV files, and import and export Paradox files. You can even use features of Superbase that are not supported in native dBASE files because Superbase maintains a companion file for all data—a unique and valuable feature. Version 2.0 now handles binary large objects, so you can store drawings, graphics, or sound in a database field.

Version 2.0's new Quick Report feature generates simple columnar reports using handy new command buttons. The new query-by-example feature allows you to define a complicated query with point-and-click ease. You can also view records in table view, with data placed in a spreadsheet-like grid.

For programmers, the Super Basic Language (SBL) includes new syntax for procedures, user-defined functions, and event-handling, much like Visual Basic. The program/text editor features online keyword help, and the debugger can step and trace through code.

Superbase goes for a steep $795, making it more expensive than Borland's Paradox and Microsoft's Access, but it earns kudos for power and a much-improved interface. RICK SCOTT

The Best Way To Send, Receive and Manage Faxes

Introducing WinFax PRO 3.0

WinFax PRO 2.0 made it easy to send and receive faxes, winning *PC Magazine*'s prestigious *Best of 1991* award in the process. But we didn't stop there. New WinFax PRO 3.0 changes the face of PC faxing once again, putting a full spectrum of powerful tools at your fingertips.

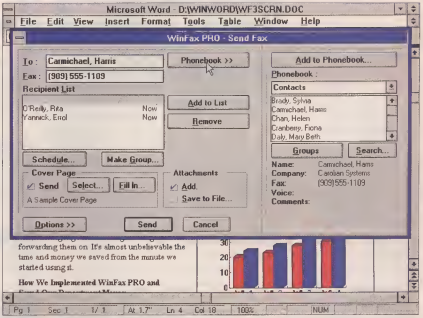
The Freedom of PC Faxing

Now, you can "one button" fax from any Windows application to any fax machine in the world. Easily combine documents from multiple applications and fax to individuals or groups anytime you want. All from the convenience and privacy of your own PC. The wasted time and aggravation of old-fashioned faxing is a thing of the past.

Powerful Tools To Manage Your Faxes

WinFax PRO's advanced document management tools enable you to file, track and quickly find the faxes you've sent or received. Mark up faxed documents right on screen, using our fully featured text and graphic annotation tools. And AnyFax™, the most advanced OCR software for faxes, directly converts them for editing in your favorite word processor or spreadsheet.

Plus, as a special introductory offer, WinFax PRO 3.0 contains Cover Your Fax™ – **a FREE $39.95 value – for a limited time only**. 101 great fax cover pages to suit all occasions. Perfect for your business or personal use.



Easily send faxes to any fax machine in the world... directly from any Windows application. Since WinFax PRO 3.0 installs just like your printer, you can fax anything that you can print.

- Receive faxes in the background
- Include multiple documents in a single fax
- Organize faxes for easy retrieval
- Convert faxes into word processing documents using OCR
- Annotate faxes with text and drawing tools
- Use advanced phonebook features, including dBASE compatibility
- Create custom fax cover sheets

Here's what the experts say:

"The best faxing software money can buy." *PC Computing*

"If you're looking for fax software, get anything with Delrina's name on it." *John C. Dvorak Syndicated Columnist*

"A small software miracle." *PC Magazine*

For your FREE Information Kit, or to upgrade from any other Delrina fax software, call

1-800-268-6082

PC MAGAZINE BEST OF 1991 — WinFax PRO 2.0

PCComputing MVP FINALIST — WinFax PRO 3.0

1992 W 100 WINDOWS MAGAZINE ANNUAL WIN AWARD — WinFax PRO 2.0

DELRINA

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Circle 227 on reader service card.

Folio Views 3.0 for Windows Ushers In Era of Electronic Books

FOLIO VIEWS 3.0 FOR WINDOWS, $495
FOLIO CORP.
2155 N. FREEDOM BLVD.
SUITE 150
PROVO, UT 84604
(800) 543-6546

FOLIO VIEWS 3.0 for Windows will finally bring on electronic books—freeing up shelf space everywhere. It is the most complete and accessible program available for creating and distributing electronic versions of policy manuals, catalogs, customer records, and other documents.

Views is a breakthrough product, but not because it sports snazzy new-generation technology. Rather, it succeeds because its elements work well together. We took a pre-release Windows version for a test ride—it's also available for DOS and the Macintosh—and were impressed. This is a well-balanced program that imposes a minimal learning curve on application developers and end users.

To create an electronic book, you generally must use either hypertext software to link related information or text-retrieval software, which searches for specific information in text files. The completely redesigned Views, which Folio calls "personal electronic publishing software," has both sets of tools.

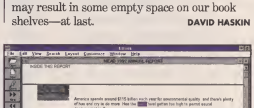
Views' text-retrieval capabilities have been beefed up to support field-based searches. The hypertext capabilities now let you create links within or between electronic documents, as well as between fields, sections, and annotations and between Views and other programs.

You create electronic books with Views by importing text or graphics files. Views automatically indexes and compresses incoming text, but you must create hypertext links manually. You can assign outline-like levels to section headings, which Views uses to create a table of contents. You can distribute electronic books over your network with an included runtime version or with the optional $195 add-in Views Lite, which lets users annotate and customize their electronic books.

Views 3.0 does have a glaring shortcoming: You can import only ASCII, Word and WordPerfect text formats, and Windows bitmap and metafile graphics formats. More import capabilities are needed.

Other hypertext and text-retrieval products boast cooler technology, but none combines their capabilities so intuitively. Folio Views may result in some empty space on our book shelves—at last.

DAVID HASKIN



Folio Views 3.0 for Windows imports text and graphics files, then you create hypertext links.

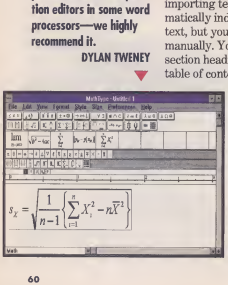
LET MATHTYPE DO EQUATIONS

Most word processors and page-layout programs simply can't handle math expressions. MathType for Windows Version 3.0, a $199 program from Design Science (800-827-0685, 310-433-0685) is a much better bet.

Creating a mathematical expression with MathType couldn't be simpler. Button bars make frequently used symbols and expressions accessible: Just point and click on the symbols you want. Insert the finished equation into any Windows app that supports object linking and embedding, and you can edit it at any time by double-clicking on it.

MathType is more powerful than the equation editors in some word processors—we highly recommend it.

DYLAN TWENEY



Backpack CD-ROM: Speedy in Spite of The Parallel Port

BACKPACK PARALLEL PORT CD-ROM DRIVE, $499
MICRO SOLUTIONS COMPUTER PRODUCTS
132 W. LINCOLN HWY.
DEKALB, IL 60115
(815) 756-3411

PARALLEL PORT CD-ROM drives are not news—but the jet-fast performance of Micro Solutions' Backpack CD-ROM drive is. To install it, just plug it into your PC's parallel port, run a setup disk, and reboot.

Theoretically, a parallel port can transfer data at about 500 kilobits per second, but a printer can't handle data at that speed. With Backpack, Micro Solutions uses an onboard cache and some proprietary technology to make sure the CD-ROM drive can transfer data at a sustained rate of 150Kbps—the minimum speed needed for the Multimedia PC specification—through any parallel port. This makes the Backpack software suitable for sound and animation apps.

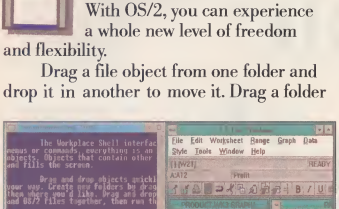
We tested Backpack with the latest iteration of Compton's (*continued on page 65*)

Now
you don't
have to
operate
within the
limits of
the system.

Operate at a

Run DOS applications. Run Windows™ applications. Run OS/2® applications. Run them at the same time, in separate windows on the same screen. With OS/2, you can experience a whole new level of freedom and flexibility.

Drag a file object from one folder and drop it in another to move it. Drag a folder object and drop it on the shredder to delete it. Drag a file object and drop it on the printer to print it. In the OS/2 Workplace Shell,™ common procedures become intuitive clicks of a mouse.



DOS and Windows support is built in to OS/2, and you can explore over 1,000 OS/2 applications as well.

Copy text from DOS applications into Windows or OS/2. Or from anywhere to anywhere. Use Dynamic Data Exchange within or between OS/2 and Windows applications. Repaginate a Word for Windows document while printing a Harvard Graphics® chart while calculating a 1-2-3® spreadsheet while downloading files via modem. Instead of calling a file "boblettr.622," call it anything you want up to 256 characters long. Instead of

IBM and OS/2 are registered trademarks and Workplace Shell and OS/2 Crash Protection are trademarks of International Business Machines Corporation. Windows is a trademark of Microsoft Corporation. Harvard Graphics is a registered trademark of Software Publishing Corporation. 1-2-3 is a registered trademark of Lotus Development Corporation. © 1993 IBM Corp.

OS/2 Advantages:

Easy to use.
–Object-oriented Workplace Shell interface.
Improves productivity.
–Runs DOS, Windows and OS/2 applications.
–Pre-emptive multitasking.
–OS/2 Crash Protection.™
Advanced 32-bit architecture.
–Fully exploits 386SX processors and above.

higher level.

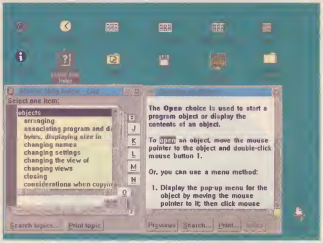
working within the 640K barrier, take advantage of more of your computer's memory.

Use the PMSeek feature to search for files. Use the built-in ICON editor to custom-design your own icons. Use the Productivity Alarms object to schedule automatic backups,

start a communications session at a specific time or run programs when you want. OS/2 lets you take full advantage of the latest 386 and 486 technology.

To find out more or to order OS/2, call **1 800 3-IBM-OS2.** In Canada, call **1 800 465-1234.** With OS/2, you can stop dealing with the limitations of the past, and start rising above them.

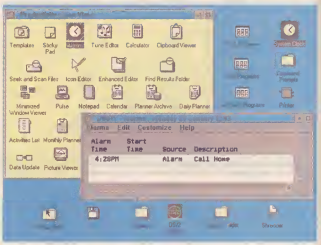
IBM®



In the Workplace Shell, everything appears as an object. It's a simple, intuitive, more efficient way to work.

With built-in networking features, OS/2 was designed to excel in both standalone and connected environments.

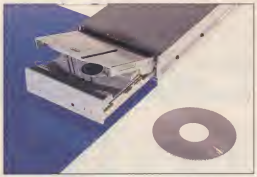
Organize and customize your desktop to look and work the way you want it to.



You can set alarms to remind you of events with the Alarms function in the Productivity folder.

BACKPACK, *from page 60*
Interactive Encyclopedia for Windows, which puts a drive through its paces with sound and animation. The video clips it produced were choppy but acceptable, and the sound was flawless. (While Backpack doesn't require a sound card, you'll need one for full multimedia capabilities.)

Access time is also important in a CD-ROM drive. In our tests, the Backpack drive's average access speed was 350 milliseconds. That's not the fastest available today, but it's more than acceptable. The parallel port on the rear panel can connect other Backpack units (such as a tape backup drive or a hard disk), but you'll probably use it to hook up your printer.



With the help of an onboard cache, the Backpack Parallel Port CD-ROM Drive transfers data at 150Kbps.

At $499, Backpack is more expensive than a permanent drive, but its incredibly simple installation brings robust CD-ROM capabilities to any PC user. **STAN MIASTKOWSKI**

Olivetti's Subnotebook Records Sound, but The Display and Keyboard Disappoint

OLIVETTI QUADERNO, $1,195
OLIVETTI NORTH AMERICA
22425 E. APPLEWAY AVE.
LIBERTY LAKE, WA 99019
(800) 633-9909

SUBNOTEBOOK PCs continue to spawn creative compromises in ergonomic design, but not always successfully. Olivetti's Quaderno is a case in point.

The Quaderno, which means *notebook* in Italian, is a fully functional XT-based system powered by NEC's 16MHz V30HL CPU. It comes with 1MB of RAM, a 21MB hard drive, and a PCMCIA Type I slot, and it has DOS 5.0 in ROM. It weighs a feathery 2.2 pounds.

The machine doubles as a tape recorder with both speaker and microphone built in (plus input and output jacks). Instead of saving audio to tape, it saves it to the hard disk in the VOI file format, and it even includes standard tape-recorder buttons on the top of the unit for recording when the computer is in standby mode. You can't be long-winded, however: A 2½-minute recording gobbles almost 250K of disk space.

One serial and one parallel port are mounted on the Quaderno's right side. An external floppy drive attaches to the parallel port, though it requires a separate power cable and adapter. A removable NiCad battery pack kept its charge for a respectable 3 hours in our tests, with all power-management features turned off. The machine comes with a host of ROM-based utilities.

While its feature set sounds appealing, the Quaderno's ergonomics shortchange its overall design. Its odd size (8.25 by 5.75 by 1.25 inches) puts it out of the league of palmtop PCs and personal digital assistants that slip handily into a jacket pocket. And despite its extra bulk, it offers little functionality over Hewlett-Packard's 95LX, which weighs half as much and costs far less ($550).

Touch-typing on the Quaderno is out of the question, and the display, a nonilluminated, transflective LCD measuring only 7.25 inches diagonally, leaves a lot to be desired. The Quaderno offers neither the utility of a subnotebook nor the portability of a palmtop. As such, it's neither here nor there. **MARTY JEROME**

Olivetti's 2.2-pound Quaderno, powered by a 16MHz NEC V30HL, has a cramped keyboard and display.

NO-FUSS TEXT TRANSLATION

Any application worth its weight translates documents from foreign file formats, but how many programs can translate 100 formats? Only one: Word for Word Windows Edition Version 5.2, from Mastersoft (800-624-6107, 602-277-0900).

While a program such as Word for Windows saves and imports files in a number of formats, Word for Word Windows Edition is more fluent: The $149 program supports 100 DOS, Windows, and Macintosh file formats for programs such as 1-2-3, Ami Pro, dBASE, FrameMaker 3.0, MacWrite, and WordStar.

Conversion is easy. In a single screen, Word for Word prompts you for the files you want to convert and how you want the new files saved. If you don't specify the format of your "source" file, no problem: Word for Word automatically recognizes more than two dozen of the most popular formats. Amazingly, it handles batches of up to 1,000 files at once.

Your converted files will retain the formatting of the originals or take on the closest equivalent the new format provides. We're impressed.

ANITA DENNIS

Give Your LaserJet a Cheap And Easy Resolution Boost

SHARPER IMAGE
Resolution boosters either increase resolution horizontally and vertically, as shown in the bottom sample, or only horizontally, as shown by the middle sample. PrintSprint, our favorite, does the latter.

DO YOU GET resolution envy from looking at the LaserJet 4's 600-dot-per-inch output? Don't give up on your LaserJet III yet. Printer add-in boards like Myriad Enterprises' PrintSprint 600 and Laser Printer Accessories' doubleRes 4 boost resolution of LaserJet IIs and IIIs.

One caveat: If most of your documents are letters and other text-only documents, save your money. PrintSprint and doubleRes offer better print quality and faster print times only when you print images.

PrintSprint 600

PrintSprint increases resolution to 600 dots horizontally by 300 dots vertically per inch. (Remember, 300 dpi is really 300 by 300 dots per inch.) Increasing the horizontal resolution doesn't require complicated electronics, and it significantly improves image quality. Images remain slightly grainy, but they have smaller dots and less noticeable patterning.

PrintSprint 600 also speeds up printing of graphics files. Using a 32-bit Windows driver from Zenographics, PrintSprint printed our seven-page PowerPoint presentation in 2 minutes and 17 seconds, while the LaserJet III took 17 minutes.

PrintSprint's big disadvantage is its restriction to a single user. It must be directly connected to the expansion board for the computer and to the regular parallel port, but the $399 list price is reasonable.

doubleRes 4

doubleRes 4, which increases both horizontal and vertical resolutions to 600 dpi, has one major advantage over PrintSprint: It's easier to install. Plug the doubleRes board into the LaserJet's modular interface slot, install the Windows driver, and you're done. You can even use standard parallel cable.

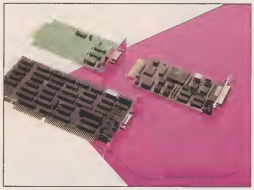
At 600 dpi, doubleRes printed our presentation significantly faster than the LaserJet III, but not as fast as PrintSprint.

doubleRes's resolution increase is an improvement over PrintSprint's 600-by-300 resolution. It's a mixed blessing, though, because bad streaking accompanies the improvement.

We recommend PrintSprint. It costs $200 less than doubleRes, is faster, and has better overall print quality. **CYNDY BATES**

DOUBLERES 4, $599
LASER PRINTER ACCESSORIES CORP.; 10865 RANCHO BERNARDO SAN DIEGO, CA 92127; (800) 225-4098, (800) 262-0522 IN CALIFORNIA, (619) 483-8411

PRINTSPRINT 600, $399
MYRIAD ENTERPRISES; 3149 BONN DR. LAGUNA BEACH, CA 92651; (800) 593-8165, (714) 494-8165



The doubleRes 4 (right) and the PrintSprint 600 (left, bottom) speed up print times of graphical images.

MicroHelp's FM Tools And UnInstaller: Two Cool Utilities

FM TOOLS, $75
UNINSTALLER, $79
MICROHELP
4359 SHALLOWFORD INDUSTRIAL PKWY.
MARIETTA, GA 30066
(800) 922-3383

IN THE GROWING wave of utilities that compensate for Windows' shortcomings, MicroHelp's FM Tools and UnInstaller stand out for their innovation, low cost, and usefulness.

Taking a different tack from many File Manager replacements, FM (File Manager) Tools extends the Windows File Manager instead of scrapping it outright. The program works with File Manager in both the plain vanilla Windows 3.1 and the toolbar-equipped File Manager in Windows for Workgroups.

FM Tools adds an application menu and an optional button bar to Windows' interface, both of which are fully customizable. The application menu can hold up to *(continued on page 70)*

There's quite a battle raging between Word and WordPerfect.

For seco

In the War of the Words, there's one clear winner. Ami Pro.

Word vs. WordPerfect.* It's billed as the battle of the world's two greatest word processors. Hardly.

According to most independent judges, Lotus® Ami Pro® 3.0 is the clear and convincing leader of the word processing pack. Word and WordPerfect are following its lead, scrapping it out for second and third.

Check the rankings.

Ami Pro 3.0 is ranked the #1 Advanced Word Processor for Windows™ by the National Software Testing Laboratories. (9/92)†

Recently, in an InfoWorld review, Ami Pro received the highest score ever given for a Windows word processor. (9/28/92)

Lotus Ami Pro captured the 1992 PC Computing MVP Award. (12/92) (Note: The MVP award also appears in the new WordPerfect ad. That's last year's award.)

PC Magazine recently named Ami Pro one of the Best Products of 1992. They said, "No other product can match ...the sheer pleasure of using it." Microsoft Word received an Honorable Mention, with the comment "...it's a step behind Ami Pro." (1/93)

Now, perhaps the battle royale between Word and WordPerfect has been put into perspective.

And you probably wonder what it is that makes Ami Pro clearly better?

†Among all word processors tested. Software Digest, Ratings Report, Vol. 9, #6, Sept. 92. Reprints available upon request. *On weekdays, plus 7AM to 4PM on Saturdays. **Offer expires 9/30/93. Call for a list of eligible word processors.
Cambridge, MA 02142. All rights reserved. Lotus and Ami Pro are registered trademarks and SmartIcons is a trademark of Lotus Development Corporation. Windows is a trademark of Microsoft Corporation. WordPerfect is a registered trademark

nd place.

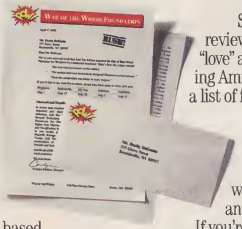
The battle of the features.

Simply put, Ami Pro is a faster, easier, friendlier word processor to use. It does so many things with so little effort, most people never even bother to open the manual.

To name a few, there's real, honest, no ifs-ands-or-buts WYSIWYG. There's Fast Format, for quick repetition of text formats. There are customizable, editable SmartIcons.™ Not to mention SmartClick, where the right mouse button will automatically shift you to the appropriate dialogue box to change fonts, styles or frame formats, based on what you're doing.

There's automatic renumbering of lists. Preview of Style Sheets. QuickStart on-line tutorial. Free 24 hour a day technical support.* And to ease your mind, a 60-day money back guarantee of your complete satisfaction.

And, if you're switching from WordPerfect for DOS, relax. Ami Pro makes it easy with a number of special features. Like seamless conversion of WordPerfect files. And a SwitchKit so that when you type in WordPerfect commands, Ami Pro shows you how to perform the same functions using pull-down menus or one-click SmartIcons.



You call the winner.

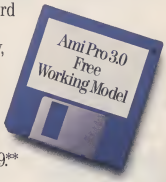
So what drives hardened reviewers to use words like "love" and "pleasure" when describing Ami Pro? You can't tell from a list of features.

You've got to experience it. In your office. On your PC.

Call us for a free working model of Ami Pro and you'll see for yourself.

If you're like most people, once you actually sit down with Ami Pro, you'll definitely choose it. Over Word. Over WordPerfect. Over every other word processor out there.

Call Lotus today, at **1-800-872-3387, ext. 8421**, for your free working model or to upgrade from your current word processor for just $129.**



Lotus. Ami Pro 3.0
Word Processor for Windows

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Circle 135 on reader service card.

PARK YOUR SPARC

You can't put a SPARC workstation on an airplane tray table, but you *can* travel with the 7-pound SPARCbook 2 notebook from Tadpole Technology (800-232-6656, 512-219-2200).

The $10,950 SPARCbook features a 40MHz SPARC processor with a 64-bit CPU/memory path and a 9.4-inch active-matrix color screen. The machine comes with one or two 250MB SCSI-2 hard drives (if you forgo a floppy drive) and 16MB of RAM. An ethernet controller is integrated, along with a 9,600-bit-per-second fax/modem.

The SPARCbook ships with the Solaris 1.0.1 operating system, Open Look, and SPARCbook OS Lite, an end-user version of Solaris that requires 38MB of disk space instead of a full 48MB. It has a full complement of ports, as well as an excellent keyboard.

Thumbs up, if you can afford it. MARTY JEROME

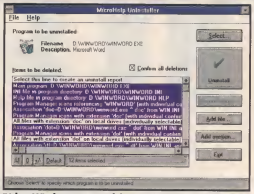
FM TOOLS, *from page 66*

12 applications and offers a feature called Fallback that lets you specify an alternative application for files that can't be processed in the selected program. Also included is Zipper, a compression utility.

Compression saves disk space, but sometimes it makes sense to get rid of unused apps. This isn't so easy in Windows, since Windows applications scatter files across multiple directories and clutter your WIN.INI file. Enter UnInstaller, a crafty utility that cleans up the messes that Windows programs leave on your hard disk. Select a program you want to delete, and UnInstaller analyzes the program's files and the references to them. You can specify what should and shouldn't be uninstalled.

One of UnInstaller's best features is Ini-Clean, which tracks changes to WIN.INI and lets you edit them while preventing you from deleting essential sections of WIN.INI. A Smart Decoy utility eliminates the system administrator's chore of uninstalling applications from multiple workstations. When you uninstall an application from a server, UnInstaller leaves a decoy copy of itself. When users attempt to run the application, Smart Decoy removes all references to the application from workstations.

At $79 each, both FM Tools and UnInstaller offer cheap solutions to some of Windows' more glaring shortcomings. **STAN MIASTKOWSKI**



Pick a Windows app to delete in MicroHelp UnInstaller, and specify what references should be deleted.

DesignCAD 6.0 Is Fast, Flexible 2-D CAD Software That Doesn't Hog Resources

DESIGNCAD 2D 6.0.
$349; UPGRADE, $59
AMERICAN SMALL BUSINESS COMPUTERS
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PRYOR, OK 74361
(918) 825-4844

FOR VERSION 6.0, American Small Business Computers overhauled its 2-D DesignCAD software. The company dramatically improved the user interface, added 50 new commands, and made it faster. It even tested well on a DOS computer with 2MB of RAM and a graphics board.

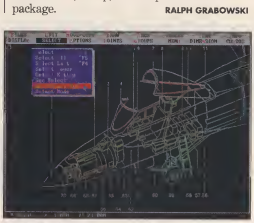
The most noticeable change is the more modern user interface. Gone is DesignCAD's kludgy, archaic look. In Version 6.0 the menu runs along the top of the screen (rather than along the side as in most other CAD packages), and pop-up menus appear to float over drawings.

When you select an object in the drawing, handles make it easier to edit the object. In addition, you can group objects and apply a single command to the whole selection.

New drawing commands let you draw Bézier curves, paint areas with solid color, and trim parallel lines at any angle. The new Repeat command duplicates entities at any angle and distance. There are new dimensioning commands for handling arcs and chamfers, as well as a feature that automatically sets dimensions for objects. Our favorite feature: the ability to preview dimension placements.

You can now have up to 256 layers and 256 colors in a drawing. And DesignCAD finally has a shell command for temporary exits to DOS.

Finally, there's good news for resource misers: The program files take up only 3.5MB of disk space. The retail price is $349, while upgrades are $59. Our verdict: The new DesignCAD is trim, cheap, and a top-notch 2-D package. **RALPH GRABOWSKI**



DesignCAD 2D 6.0 sports a modern user interface with pop-up menus that appear to float over drawings.

A basic idea of how our new PC will accelerate Windows.

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intel inside

The improvement in performance is so dramatic, you've got to see the Epson Progression to believe it. So we've created a video to let you do just that. For your free copy, call 1-800-BUY-EPSON. But hurry. They're going very, very fast.

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Bundle from Media Vision: One-Stop Multimedia Shopping

FUSION CD 16, $749
MEDIA VISION
3185 LAURELVIEW COURT
FREMONT, CA 94538
(800) 845-5870
(510) 770-8600

MULTIMEDIA COMES IN a suitcase. At least it does if you buy Media Vision's Fusion CD 16, a suitcase-size collection of all the hardware and software you need—a 16-bit sound card that compares well to Creative Labs' Sound Blaster 16, a CD-ROM drive, speakers, and several popular CD applications—to turn your PC into a multimedia attraction for under $750. If you're buying a new multimedia PC, get Insight's 486DX2 (see page 40). If you're upgrading, though, Media Vision has a solution.

The centerpiece of Fusion CD 16 is its hardware. It comes with Media Vision's own Pro AudioSpectrum 16 sound card (which handles CD-quality 16-bit stereo recording and playback at 44Hz using a 20-voice synthesizer) and a 650-millisecond external SCSI NEC CD-ROM drive. A version of Fusion CD with an internal Sony drive is available for $699.

Unpacking and installing the Fusion CD hardware is painless—Media Vision has done a fine job of streamlining what is usually a tedious and complex process. The installation software automatically detects and configures the proper interrupt request and direct memory access settings. Labtec speakers lets you hear what the sound card and CD-ROM drive can deliver.

Titles Get You Started

Fusion CD 16 includes several CD-ROM titles to get you started, including Compton's Family Encyclopedia with World Atlas, Broderbund's Where in the World is Carmen Sandiego?, Microprose's Mantis, and several other entertainment titles. As usual, such multimedia applications don't mean you'll get your work done much more efficiently, but they will command your attention. The Fusion's CD-ROM drive also supports Kodak's Photo CD technology for reading color-film images from a compact disc. Several additional DOS and Windows utilities allow you to record and edit sound files or play audio CDs in the CD-ROM drive.

DOS or Windows?

Although it requires a Windows-capable 386SX machine or better, the Fusion CD 16 is geared toward DOS users experimenting with sound and multimedia. Windows users will find the CD-ROM drive to be slow, and the included CD titles are all DOS-based. Media Vision's similar suitcase-size bundle, the Pro 16 Multimedia System, is better suited for Windows. At $1,195 it includes a 16-bit sound card, a faster (280ms access time) NEC drive, Macromind Action presentation software, Lotus 1-2-3 for Windows with Multimedia SmartHelp, and several Windows and DOS entertainment titles.

Both bundles pack a lot of value, but the Pro 16—because it's more suitable for Windows users—is the more forward-thinking solution.

WENDY TAYLOR

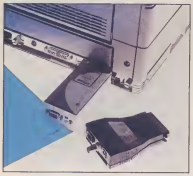
Media Vision's Fusion CD 16 makes upgrading your PC to a multimedia machine easy. The $749 suitcase-size package includes speakers, a 16-bit sound card, a CD-ROM drive, and several CD-ROM applications.

SIMPLY SETUP PRINT SERVER

Convert any printer into a NetWare network printer in ten minutes with the $495 PacketPrintServer from Extended Systems (800-235-7576, 208-322-7575). As its name implies, this 20-ounce, 5.2-by-2.45-inch device is a full-featured dedicated ethernet print server that offers several benefits over other dedicated print servers. It's faster, pumping data through at up to 60 kilobytes per second (four to eight times faster than a standard parallel port). It also offers automatic font downloading and automatic language switching.

You can't buy a simpler print server.

JOHN TASCHEK



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HandBook Combo: Two Computer Systems, in Tune with Each Other, for One Low Price!

When you buy a HandBook Combo, you get two PCs for less than you could pay for a single system. Our combo offers include the HandBook, our notebook-palmtop hybrid, and one of Gateway's high-performance, feature-packed desktop systems. The HandBook is the ideal portable PC for most users because it's marvelously compact – just 6 x 10 inches and 2.75 pounds – yet it does everything most people need to do on a portable PC. With its auto-resume feature, access to thousands of available DOS applications is almost instantaneous. You can quickly touch-type a note on its comfortable keyboard, check your schedule on the HandBook's backlit screen, or access 40 megabytes of data instantly, all without waiting to boot-up. When you come back to your office, you can easily connect your HandBook to your desktop. To transfer files back and forth, your HandBook actually functions as a logical drive on your PC. It's a snap! We've included everything and set it all up for you, even MS Works on both computers.

Two computers. Two functions. One low price. Can you dig it? Call Gateway!

We've Got A Portable Solu

Who says notebook PCs are only for serious globetrotters? They're also cool for people who only travel from home to office. Or how about corporate cats who travel from conference room to conference room for those perpetual meetings? Or sales people who could dig a computer at their client's location? Really, most people would enjoy the convenience of the right portable. But who can afford both a portable and a desktop PC? *You* can! Gateway 2000 has the portable solution that's in tune with you!

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With a Nomad Combo from Gateway, you don't have to buy two PCs. You get a very powerful notebook computer, one of Gateway 2000's top-of-the-charts Nomad models, with a 15-inch CrystalScan high-resolution color monitor and our custom 124-key AnyKey keyboard. You can use the Nomad by itself in portable situations. At just 5.6 pounds, with a bright, backlit screen, comfortable keyboard, great battery life and 486 performance, it's all you could ever want in a notebook. In your office, the Nomad functions as your desktop. Just plug it in to the desktop monitor and keyboard, and you have a 486 office PC. It's easy to tie into your company's network, too, with Ethernet and Token Ring options available. Gateway Nomads are powerful, expandable and affordable.

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HandBook

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- Backlit 7.6" 640 x 400 Screen
- 2.75 Lbs., 5.9" x 9.75" x 1.4"
- 4.5-Hr. Battery & AC Pack
- MS-DOS,® InterLink,® MS Works™ for DOS

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- Windows Accelerated Video w/ 1MB
- 14" Color CrystalScan 1024NI
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- MS-DOS,® InterLink,® MS Works™ for DOS

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- 2400bps Fax/Modem
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- 79-Key Keyboard & FieldMouse
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- 6-Hr. NiCad Battery & AC Pack
- 1 Parallel/1 Serial Port
- 79-Key Keyboard & FieldMouse
- MS-DOS 5.0 and Windows 3.1
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- Nomad 425SXL*
- 15" Color CrystalScan 1572FS
- 124-Key AnyKey Keyboard
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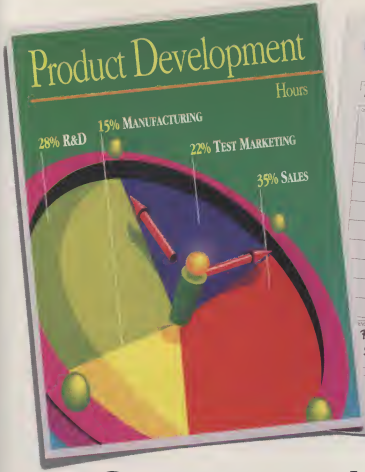

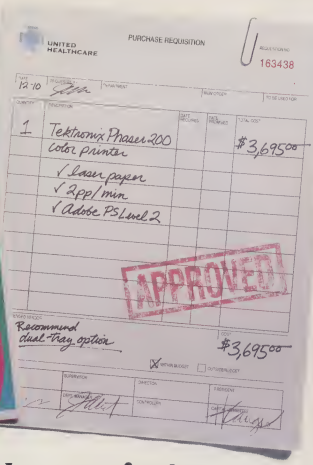

Our new color printer not only looks great on paper, it looks great on paper.

True, the brilliant color produced by the new Tektronix Phaser® 200 is captivating. But the price is equally attractive. And though we've become the award-winning leader in color printers by frequently outdoing the competition, this time we've even outdone ourselves. Introducing our newest business work group color printer.

The eye when it sees black and white.

The eye when it sees color.

The Phaser 200 is compatible with virtually any business software and can print two colorful pages per minute. No, not two minutes per page—two pages per minute. And even at a speed like that, it still manages to print eye-catching color on common laser paper or transparencies using a separate input tray for each. You select the medium you want at your computer keyboard. And it switches automatically from user to user just as easily, using its parallel, serial, AppleTalk,™ or optional EtherTalk™ and Ethernet™ ports.

It has all the advantages of a laser printer. True Adobe PostScript™ Level 2, networkability, Pantone® colors, speed and price. (Did you notice it's only $3695, slightly below unheard of?) And when you add to that extremely high materials capacity and sparkling TekColor™ output—not just any color, but the indisputably best color in the business—you've got something even better than our previous best. Which is quite a feat.

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Tektronix

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Circle 172 on reader service card.

Spotlight

Statistical Forecasting

Managers in search of a better crystal ball now have a host of statistical-forecasting tools at their disposal. These programs help with projections of sales, revenues, product demand, and budget-line costs.

Version 3.0 of Smart Software's **SmartForecasts,** which is based on the Box-Jenkins forecasting technique, began shipping recently. The program features an Eyeball utility that lets you adjust your statistical forecasts onscreen. The latest release provides S-curve models for help in new-product forecasting and a Multiseries feature that processes up to 60 variables for product-line forecasts. ($595; Smart Software; 800-762-7899, 617-489-2743)

Forecast Pro 1.01 for Windows, a rule-based expert system, analyzes your data, then recommends a forecasting technique, such as exponential-smoothing models, Box-Jenkins, dynamic regression, and methods designed for short data sets. Forecast Pro even explains the reasoning behind its recommendation. A graphics utility lets you display, adjust, and print your forecasts on the fly. ($595; Business Forecast Systems; 617-484-5050)

Intex Solutions, publishers of **Forecast,** a 1-2-3 add-in, have shipped an Excel version. The program offers linear and nonlinear time-series analysis, multiple regression routines, smoothing, filtering, and advanced diagnostics such as the Durbin-Watson statistic. It can generate forecasts with as many as 300 historical observations for up to 52 periods into the future. ($165; Intex Solutions; 617-449-6222)

THE LATEST UPGRADES TO PRODUCTS YOU USE

BY MARTY JEROME

Clipper 5.2

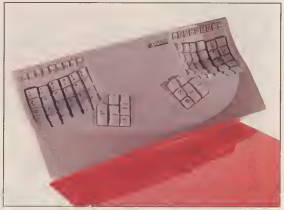
Clipper 5.2 brings users much-needed bug fixes as well as replaceable database drivers that give developers read-and-write access to FoxPro 2.0, Paradox, and dBASE IV files. Computer Associates, publisher of Clipper, has also released an application program interface for the database's screen layout and virtual memory management system. ($795; Computer Associates International; 800-225-5224, 516-225-5224)

Ventura Publisher's PowerPak

Desktop publishing giant Ventura has introduced the Publisher's PowerPak, a bundle of four Windows-based publishing programs: Ventura Publisher 4.1, Ventura DataBase Publisher 4.0, Ventura AdPro 1.1, and Ventura PicturePro 1.1. ($995; Ventura Software; 800-822-8221, 619-673-0172)

Microsoft Office for Windows 3.0 for CD-ROM

Microsoft now offers Office, a CD-ROM bundle that includes Excel, Word for Windows, PowerPoint, and Mail—and their manuals. One routine installs all four programs on your hard disk, thereby dispensing with the 17 floppy disks the process would normally require. ($750; Microsoft Corp.; 800-426-9400, 206-882-8080)



The Ultimate in Ergonomics

The add-looking Kinesis Ergonamic Keyboard splits the traditional keyboard layout into two separate keypads so that your hands are positioned at shoulder width, not pressed together. The keypads are angled so that your hands extend straight out from your wrists, rather than bending inward. The result is more comfortable typing. ($690; Kinesis Corp.; 206-455-9220)

Symantec Guide Line and Guide Line Maker

Symantec's $149.95 Guide Line, the newest edition to the company's family of project-management software, lets users build projects by answering a series of fill-in-the-blank questions. The Windows version (it comes in a DOS version as well) works with Time Line for Windows, On Target, and Microsoft Project for Windows. Symantec also introduced Guide Line Maker, a $499 authoring tool that lets users build project-management guides. (Symantec Corp.; 800-441-7234, 408-252-3570)

Micrografx ABC FlowCharter 2.0

After acquiring ABC FlowCharter from Roykore, Micrografx is shipping Version 2.0 of the Windows-based flowcharting package. The new version delivers 15 new palettes of shapes as diverse as electronic symbols and office furniture. Users can customize shapes or create new ones. ($495; Micrografx; 800-733-3729, 214-994-6287)

hDC FirstApps 2.0 and Windows Express 4.0

hDC Computer Corporation, maker of Power Launcher, has rolled out upgrades to FirstApps and Windows Express. Version 2.0 of FirstApps ($99.95), an application launcher, now includes memory, system-resource, and disk viewers, as well as a ZIP-compatible file-compression program and enhanced file tools. The Windows Express 4.0 ($99.95) menuing system now features the company's Enhanced Commands technology, a drag-and-drop scripting language. (hDC Computer Corp.; 800-321-4606, 206-885-5550)

STORAGE PRODUCT OF THE YEAR

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PC COMPUTING

Circle 185 on reader service card.

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THE OPTICAL STORAGE COMPANY®

Short Takes

Frontier Technologies' Super-TCP for Windows brings multimedia to e-mail. You can combine images, graphics, and spreadsheets, and attach audio and digital-video objects to e-mail sent over Internet TCP/IP networks. ($495; Frontier Technologies Corp.; 414-241-4555)

Bus Logic's BT-445S host adapter puts a fast SCSI-2 drive controller on VESA local bus. Powered by a 10MHz 80188 chip, the host card manages SCSI data-transfer at up to 10 megabytes per second. ($499; BusLogic; 408-492-9090)

Fourth Wave Technologies' WinBeep offers PC-to-beeper communications via Windows. You can send messages to alphanumeric pagers via any standard modem. ($149; Fourth Wave Technologies; 313-362-2288)

Paper Software's SideBar 2.0 Windows shell bridges Windows, DOS, and Macintosh interfaces. The program stores files and apps as icons within nested group windows. It has a file manager and a scheduler that launches apps at specific times. It also provides access to a DOS prompt, so a Windows program can be driven from the command line. ($69.99; Paper Software; 800-551-5187)

Focus Information Systems' 2the Max OptiView, a Windows-based video-capture board, has just shipped. Designed for use with Video for Windows, the board digitizes NTSC, PAL, and SECAM video. ($329; Focus Information Systems; 800-925-2378, 510-657-2845)

Maxtor MXL-105-III

Maxtor has introduced the MXL-105-III, a 105MB PCMCIA hard drive. Weighing only 2.5 ounces, the Type III drive is about the size of a credit card and half the thickness of a deck of playing cards. ($499; Maxtor Corp.; 800-462-9867, 408-432-1700)

Unisys PW² Family, Advantage Plus

Unisys has introduced three Intel 486DX- and 486DX2-based systems that are upgradable to the Pentium. Each is an EISA-based PC with ATI's mach32 graphics accelerator running on local bus. Adaptec's Arrow SCSI controller is integrated on the motherboard, as is an ethernet 10BaseT network interface running on local bus. ($2,899 to $5,999; Unisys Corp.; 800-448-1424, 716-292-0880)

dSalvage Professional 4.0

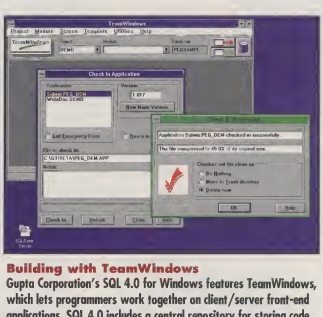
dSalvage Professional 4.0 from Comtech Publishing recovers damaged dBASE and FoxPro files. Version 4.0 supports the new field types in FoxPro 2.5 and recovers memo files and memo-field pointers. ($199.95; Comtech Publishing; 800-456-7005, 702-825-9000)

Austin VESA Local-Bus Systems

Austin Computer Systems is equipping its VESA local-bus systems with S3's 86C805 graphics accelerator cards. A 486SX/25 with a 170MB hard drive is $1,595; a 66MHz 486DX2 with a 330MB hard drive costs $2,995. (Austin Computer Systems; 800-752-1577, 512-339-3500)

Swan Direct Bus Systems

Swan Technologies' Direct Bus Systems are now VESA compatible and feature two VESA local-bus slots. Outfitted with a 32-bit VeLocity video card, 4MB of RAM, and a 170MB hard drive, a 25MHz 486SX costs $1,849; the 66MHz 486DX2 model with 8MB of RAM and a 230MB hard drive costs $2,849. (Swan Technologies; 800-468-9044, 814-234-2236)



Building with TeamWindows
Gupta Corporation's SQL 4.0 for Windows features TeamWindows, which lets programmers work together on client/server front-end applications. SQL 4.0 includes a central repository for storing code. ($3,495 for the Corporate Edition; $1,995 for the single-user Standard Edition; Gupta Corp.; 800-876-3267, 415-321-9500)

Commence 1.0

Having regained the rights to IBM's Current, Jensen-Jones has unveiled Commence. The new personal information manager features the same half-dozen miniapps, including a calendar and a phone log, but the interface has been overhauled, now featuring more easily identifiable icons and command buttons, as well as streamlined procedures for designing fields and linking data. ($395; Jensen-Jones; 800-289-1548, 908-530-4666)

RasterOps CorrectPrint 300i

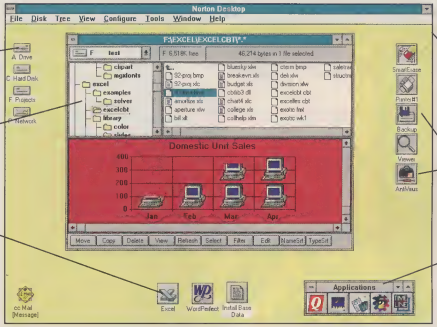
RasterOps has upgraded its dye-sublimation printer. The new $7,999 printer features 24-bit color, 36MB of RAM, and TCP/IP support. (RasterOps Corp.; 800-729-2656)

NORTON DESKTOP FOR WINDOWS SAVES TIME, MONEY, ENERGY, AND DATA.

With Norton Desktop for Windows, your drive icons sit right on the desktop, so you get direct access to your files.

Click on a drive icon for easy file management. The drive window includes a tree pane, file pane, and a customizable button bar with a view option.

For total convenience, applications or files can be dragged onto the desktop for easy access. Open files effortlessly with a quick mouse click or, by dragging the file to the application.



The Norton Desktop is a completely integrated environment. You can drag-and-drop files from the drive window to a tool, drive icon, application, or onto the desktop itself.

All the utilities you need to backup, protect, and repair your data sit right on your desktop. You can drag files or drive icons directly to the tool you need.

Keep your favorite applications in a handy customizable toolbar. Launch the application easily with just a click of the mouse.

That's a package full of savings. Norton Desktop for Windows 2.0 enhances Windows in all the important ways. It helps you work faster, smarter, and with better results.

Saves Time.

Something you don't have a lot of. We've improved file management, placing drive icons right on the desktop, so you get immediate access to all your files and applications. Speed search, button bar, viewer, customizable fonts, and collapsible tree structure are all designed to save you time. Full drag-and-drop allows you to drag applications and files out of the drive window to anywhere on the desktop so you have instant access to them.

Saves Money.

We all know time is money. And because Norton Desktop looks so much like Windows, you won't have to waste time learning how to use it. You get most everything you need to run your PC in one comprehensive package — a great, money-saving value.

Saves Energy.

Because Norton Desktop can be easily customized, you invest your energy in your work, not in trying to figure out how to get it done. Customizable auto-load frees you from reloading applications that you use daily. And, SuperFind™ allows you to locate "lost" files, across networks or in the background.

Saves Data.

Lost or corrupted data can cost you time, money, and energy. The selection of utilities in Norton Desktop helps you maintain your data. Virus protection and repair, automatic backup, and data recovery can be easily accessed from the desktop; or, scheduled to run unattended, or in the background. Plus, they support all major networks. Norton Desktop for Windows 2.0 is just $179.00 (S.R.P.) at your dealer. Or, call **1-800-554-4403** for an instant FAX Data Sheet (enter 450).** The sooner you get it the sooner you'll save.

Network Manager Admin Pack NOW AVAILABLE! Call 1-800-343-4714 ext. 404 for more information.

© 1992 Symantec Corporation. * Price in U.S. dollars ** For information in Canada, call 1-800-465-2296. In Europe, call 31-71-533111. In Australia, call 612-879-6677. Everywhere else, call 408-252-3670. All trademarks or registered trademarks are those of their respective holders.

SYMANTEC.™

Circle 141 on reader service card.

A great product.

FaxMaster for Windows does it all.
With *FaxMaster*™ you get the world's most advanced fax software solution. When it comes to sending documents, you can transform any Windows™-based system into "Fax Grand Central." Send faxes directly from the "fax button" *FaxMaster* places inside your applications. Scan and fax paper documents with one of 40 supported scanners. Broadcast faxes to groups of clients, and schedule them when rates are lowest.

With *FaxMaster*, sending faxes is just the start. *FaxMaster* comes with Caere's industry standard AnyFax™ OCR (optical character recognition) technology built in – so you can actually convert faxes into electronic text – even those sent in standard mode. And, for saving faxes, *FaxMaster* also includes Caere's SuperCompression™ technology to compress original faxes up to 33 times over the original. With all these capabilities, *FaxMaster* has quickly become the software choice for those who require more.

FaxMaster Server now supports your entire workgroup.
FaxMaster is just too good an idea not to share. That's why Caere developed *FaxMaster Server*, the first Windows fax solution that can transform a single fax board into a network fax server. Simply install *FaxMaster Server* and a fax board on the dusty 286 in your closet, then add a copy of *FaxMaster* for each user. Your entire workgroup can be fax-enabled economically, with just one phone line and a fax

So why not share it?

modem. Don't be fooled by other seemingly inexpensive fax software products that require a separate phone line and fax board on every computer. *FaxMaster* with *FaxMaster Server* is the only fax solution today that lets you expand your fax capabilities so efficiently and economically, in just about any network environment. *FaxMaster*, a great product you can share.

FaxMaster let's you do more with less.

There's no need to wait any longer, whether you're considering a personal fax solution, or "*faxamating*" an entire workgroup. Caere was the first to bring you accurate fax OCR and SuperCompression. Now Caere brings you the first scaleable fax software solution for Windows.

Start with a single solution and grow. *FaxMaster* retails for $149, *FaxMaster Server* for $695. To help you manage all your costs, Caere has even put together the world's first Fax "WorkGroup in a Box" for 5 users for only $995. Call the Caere Dealer nearest you.

FAX RELIEF
$79
1-800-643-3915
COMPETITIVE UPGRADE

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Circle 169 on reader service card.

BY PRESTON GRALLA

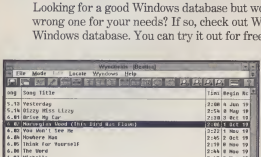
Get Borland's Windows Spreadsheet And Database for a Song

Prices for Windows software continue to plummet, and you're the winner. Borland, in particular, is making some truly astounding offers. You can now get Quattro Pro for Windows for $99.95, compared to its regular price of $495. And if you're interested in Paradox for Windows, you can get an even better deal: The program is available for $139.95. (Normally, Paradox for Windows would sell for $795.) These are once-in-a-millenium bargains. For more details, call Borland at (800) 331-0877.

PC Contact

Try-Before-You-Buy Windows Database

Looking for a good Windows database but worried that you may choose the wrong one for your needs? If so, check out Wyndfields for Windows, a shareware Windows database. You can try it out for free and pay for it only if you like it.



Wyndfields for Windows 1.2 is a relational database that lets you quickly set up new databases and includes a feature for updating or deleting multiple records based on search conditions. Sample the program for free from PC/Contact, *PC/Computing*'s online service on ZiffNet, as WYNFLD.ZIP in data library 3 (Utilities/Misc.). If you like it, you can register it for $99. For details, call Wyndware at (800) 475-1628, or write to One Parker Place, Suite 308, Janesville, WI 53545.

Great Deal on Mustek Color Hand Scanner

Color scanners have been coming down in price and are finally affordable. While these scanners used to be toys, now they're dependable tools. The newest great deal is from Mustek: The company is selling a color hand scanner and a slew of bundled software for $599. The 24-bit 800-dot-per-inch ColorArtist Pro hand scanner promises TWAIN support and comes with Picture Publisher 3.1 LE image-manipulation software, Perceive Personal OCR software, and Mustek Slideshow, which lets you create onscreen presentations from scanned-in images. For details, call Mustek at (800) 468-7835.

Score a Review Copy Of QuarkXPress for Under $10

Quark is offering an impossible-to-beat offer: Believe it or not, you can get a tryout copy of QuarkXPress for Windows, the powerful desktop publishing program, for only $9.95. If you've never tried a truly industrial-strength DTP package due to sky-high prices, this is the deal for you. You don't get technical support and you can't print more than five pages of a document, but otherwise, you get the same high-end publishing program that lists for $895 and won a *PC/Computing* MVP Award for 1992. Call Quark at (800) 788-7830 for details on this unusual bargain.

BEST SOFTWARE BUYS

Where can you get the best software deal? Usually through the mail. We surveyed mail-order houses and came up with the best prices we could find. The following prices include shipping and handling charges but not credit-card surcharges. Prices are as of press time and are subject to change.

PRODUCT	LIST PRICE	BEST PRICE	SOURCE
DOS 5.0 Upgrade	$99.95	$52.00	Lomo, (800) 369-2846
Excel 4.0	$495.00	$299.00	Software Unlimited, (800) 926-7638
Lotus 1-2-3 Plus 3.4	$595.00	$409.95	Computability, (800) 558-0003
Microsoft Word 5.5	$450.00	$218.00	PC Zone, (800) 252-0386
Norton Utilities 6.01	$179.00	$97.43	Computer Discount Warehouse, (800) 473-4239
QEMM-386	$99.95	$61.00	Lomo, (800) 369-2846
Quattro Pro 4.0	$495.00	$93.00	Telemart, (800) 537-4735
Windows 3.1	$149.00	$92.00	Lomo, (800) 369-2846
Word for Windows 2.0	$495.00	$292.00	Software Unlimited, (800) 926-7638
WordPerfect 5.1	$495.00	$255.00	Lomo, (800) 369-2846
WordPerfect for Windows 5.2	$495.00	$269.00	Dustin, (800) 477-3878

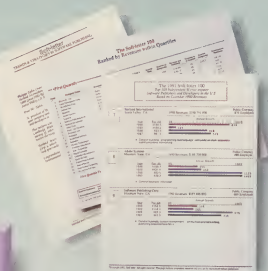
Database reports fast and easy!

"(We) created a report in just four clicks of the mouse."
PC Week, December, 1992

R&R Report Writer, the ultimate data access and reporting tool, enables you to select, analyze, summarize, and present data in any form you need – columnar listings, form letters, mailing labels, business forms, even multi-page analytical reports.

Nothing beats R&R for ad hoc database reporting. Versions now available for:

Xbase (.dbf)	**Paradox**
dBASE	**Worksheets**
Fox	**1-2-3**
Clipper	**Symphony**
Alpha Four	**Quattro Pro**
Arago	**Oracle SQL**
Access	**NetWare SQL**
Approach	**XDB SQL**
PerForm	**Platinum**
SBT	**Telemagic**



Simply the best for all-around report writing!

R&R has all the features to meet your every reporting need. Relate and query data, sort and group information, use spreadsheet calculations and totals. You can even format your layout with different fonts to get polished reports that will make you look great!

Turn your raw data into useful information.

R&R's clean, uncluttered interface makes it the most user-friendly report writer available today. Create any report you need, exactly the way you need it – without having to be an expert in database programming.

The professional strength report writer.

R&R is easy-to-use, yet it's packed with features to satisfy even the most demanding application developers. Features like an unlimited-use, royalty-free runtime version, allow you to distribute reports freely or weave them into your applications–a real time saver!

FREE demo disk. Call today!

Over 150,000 users have made R&R Report Writer the industry standard...

R&R consistently wins praise from reviewers, developers, and end-users alike. And, great reports keep coming in:

"R&R is the best report writer for Xbase and may very well be among the best ever offered for databases."
BYTE, July, 1992

"...the product does exactly what it advertises and does it well." **DBMS, January, 1992**

When you need database reports, R&R gives you the productivity you need every time, on time. At just $249, R&R for Xbase is an unbeatable value. Order today or call for the dealer nearest you:

800-325-9035 *Ext. 8311*

$25 Rebate

Now through June 30, 1993, purchase any R&R Report Writer and receive a $25 manufacturer's rebate.

Valid on purchases made between 2/15/93 and 6/30/93 in U.S. and Canada only. Offer valid only to R&R customers. Rebate paid in U.S. dollars. Send rebate coupon, product serial number, and original store receipt showing date, store name, invoice number and product purchased to: R&R Rebate, Concentric Data Systems, 110 Turnpike Road, Westboro, MA 01581. Must be received by 7/15/93. Allow 4-6 weeks for delivery. Void where prohibited.

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Software Saleswire

Lotus 1-2-3 for Windows from Lotus Development (800-343-5415, 617-577-8500) is catching up with the competition. Although not as powerful or fast as Excel or Quattro Pro for Windows, it's managing to hold its own. Look for a version of 1-2-3 for Windows later this year that should bring the program more in line with the competition. The new version should allow you to easily select discontinuous ranges, columns, and rows. Also planned is intelligent charting, in which the software chooses the most appropriate type of chart for your data and automatically composes a title and a legend. These features, incidentally, are already in Excel 4.0.

Feb	Jan	
1	1	**WORDPERFECT 5.1 FOR DOS** (WordPerfect) The most popular word processor holds its own against the onslaught of fancier Windows programs. $495.
2	-	**PARADOX FOR DOS 4.0** (Borland) This fast database for DOS includes fully integrated presentation graphics features, cross-tabulation, and a query-by-example interface. $795.
3	4	**MICROSOFT ACCESS** (Microsoft) A friendly yet powerful relational database for Windows. Context-sensitive toolbars make application-development a snap. $495.
4	2	**EXCEL 4.0** (Microsoft) A powerful Windows spreadsheet with excellent database features and outstanding graphics. $495.
5	-	**WORDPERFECT 5.2 FOR WINDOWS** (WordPerfect) This version includes Grammatik V, Adobe Type Manager, and new fonts. $495.
6	-	**LOTUS 1-2-3 FOR WINDOWS 1.1** (Lotus Development) Compatible with all 1-2-3 files, styles, and macros, the newest 1-2-3 release boosts performance in printing, display, and loading. $495.
7	7	**PROCOMM PLUS 2.01** (Datastorm Technologies) This updated DOS communications program includes a companion text editor, password protection, and extensive file-transfer capabilities. $129.
8	6	**OFFICE FOR WINDOWS** (Microsoft) Microsoft's business bundle includes four leading Windows business apps: Excel, Word, PowerPoint, and Mail Workstation License for PC networks. $750.
9	9	**PROCOMM PLUS FOR WINDOWS** (Datastorm Technologies) This popular communications program contains 34 terminal emulations and 10 error-correcting file-transfer protocols. $179.
10	3	**LOTUS 1-2-3** (Lotus Development) Create larger 3-D worksheets and published reports using advanced formatting, text, and graphics tools: Release 2.4, $495; Release 3.1 Plus, $595.

1	2	**QUICKEN** (Intuit) Finances for nonaccountants. One entry updates all appropriate accounts. Add-ins to the DOS version also make running a small business easier and more cost effective. $69.95.
2	1	**QUICKEN FOR WINDOWS** (Intuit) Organizes finances painlessly with QuickFill automatic data entry, IntelliCharge credit-card checking, and a single-line register view. $69.95.
3	4	**TURBOTAX FOR TAX YEAR 1992** (ChipSoft) Complete tax returns quickly with pull-down menus and expanded help features. Entries are automatically posted in IRS-approved forms. $79.95.
4	5	**THE PRINT SHOP DELUXE** (Broderbund) The Deluxe edition makes better-looking cards, flyers, and calendars with 30 smooth, sharp fonts. Includes shadow, fill, and outline special effects. $79.95.
5	7	**TURBOTAX 1992 FOR WINDOWS** (ChipSoft) The EasyStep System guides you through preparing your tax return. It suggests how to save money and avoid an audit. $79.95.
6	6	**MONEY FOR WINDOWS** (Microsoft) Create budgets, track expenses, and reconcile accounts. The Automatic Setup, onscreen coaches, and SmartFill features speed up the process. $69.95.
7	-	**ANDREW TOBIAS' MANAGING YOUR MONEY** (Meca) Balance your budget and plan long-term goals. Develop strategies for spending, saving, investing, and paying taxes. $79.95.
8	-	**QUICKBOOKS** (Intuit) Small-business accounting tasks are completed automatically with transactions placed on familiar forms. Includes QuickTrainer, a proactive help system. $139.95.
9	9	**CALENDAR CREATOR PLUS** (Power Up) Create attractive calendars for personal and business activities by selecting clip art and scalable fonts from this DOS-based program. $69.95.
10	5	**PRINT SHOP DELUXE FOR WINDOWS** (Broderbund) Easy-to-use interface with the same powerful features found in the DOS Deluxe version. $79.95.

These software charts are compiled once each month by G. Meier, Inc., which gathers ranked-order sales information supplied by the following software industry sources: ABCO Distributors; American Software; Babbages; CompuAdd; CompUSA; Corporate Software; Dustin Discount Software; Electronic Arts Distribution; Ingrom-Micro; Kenfil; Merisel; Micro Warehouse; Multiple Zones; PC Connection; Soft Kat; Software, Etc.; Software Plus; Software Resource; Software Spectrum; and Waldensoftware. A weighting system is applied to each entry based on three factors: the entry's position in the individual chart, the power of the contributing source based on annual gross sales, and the relative strength of a source in a given category of software. All prices are suggested retail and are subject to change.

Feb	Jan	
1	4	**STACKER 3.0 FOR WINDOWS AND DOS** (Stac Electronics) Increase hard disk storage by 100 percent. Includes disk caching and is fast and easy to install. Software only, $149.
2	1	**WINDOWS 3.1** (Microsoft) Transform your PC into a graphical multiapplication environment and exchange text, numbers, and graphics easily between applications. $149.95.
3	2	**MS-DOS 5.0** (Microsoft) This version includes better memory management, full mouse support, and a text editor. Improved SYS, DIR, and CHKDSK commands are also part of the overhaul. $99.95.
4	3	**QEMM-386** (Quarterdeck) This memory manager frees memory for primary applications by loading drivers, pop-up utilities, and DOS resources into high memory. $99.95.
5	5	**AFTER DARK FOR WINDOWS** (Berkeley Systems) Give Windows a break with flying toasters, fish, and other whimsical animated images. The WallZapper turns a display into wallpaper. $49.95.
6	-	**STAR TREK: THE SCREEN SAVER** (Berkeley Systems) Beam up Dr. Spock and Captain Kirk, and explore the galaxy with this new Windows screen saver. $59.95.
7	7	**WINDOWS FOR WORKGROUPS** (Microsoft) Share files, applications, and printers with a group. Simple icons let you chat with colleagues or leave messages. Novell NetWare compatible. $249.95.
8	9	**LANTASTIC/AI 4.1** (Artisoft) This DOS-based, RAM-efficient network operating system requires as little as 12K per workstation and 40K per server. $99 per node; 300-user license, $2,499.
9	-	**NETWARE LITE/DR DOS** (Novell) This special promotional bundle uses the successful NetWare Lite to stimulate interest in DR DOS, Digital Research's operating system. $129.
10	6	**PC TOOLS 8.0** (Central Point Software) This latest DOS upgrade contains 30 integrated utilities for troubleshooting and fine-tuning your system. $179.

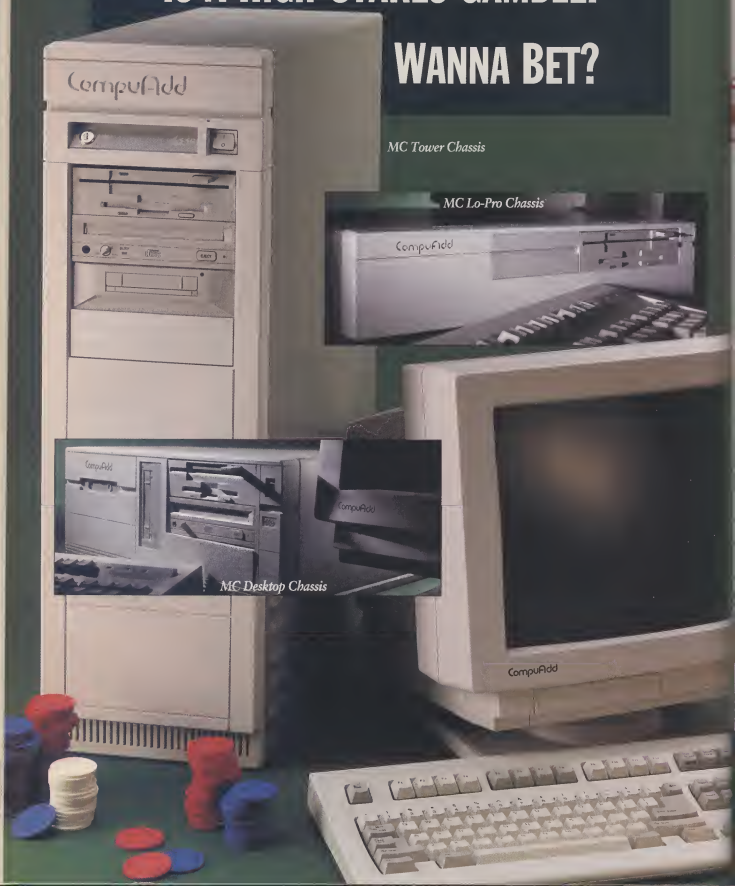
1	2	**THE OREGON TRAIL** (MECC) Plan an adventure traveling the Oregon Trail in 1848. Forge rivers, scale mountains, and face pioneer challenges in this adventure game. $49.95.
2	3	**READER RABBIT 2** (Learning Company) Children discover the sights, sounds, and meanings of words as they develop first- and second-grade reading skills. For children aged 5 through 8. $59.95.
3	1	**NEW MATH BLASTER PLUS** (Davidson) Arcade-style games cover basic math skills, including fractions, decimals, and percents. Four new challenging activities are enhanced by graphics. $49.95.
4	6	**READING ADVENTURES IN OZ** (Davidson) Children aged 4 through 9 learn basic skills such as color and shape recognition in the land of Oz. Three reading and problem-solving skill levels. $59.95.
5	8	**TREASURE COVE** (Learning Company) Develop science, reading, and math skills during an underseo adventure. For children aged 5 through 9. $59.95.
6	5	**WHERE IN THE WORLD IS CARMEN SANDIEGO?** (Broderbund) Ten suspects in any one of 30 cities bring world geography alive. Includes 1,000 clues and the World Almanac. $49.95.
7	9	**TIME RIDERS IN AMERICAN HISTORY** (Learning Company) Players will have hours of fun rescuing the world from chaos while learning about historical events and famous people. $59.95.
8	4	**WHERE IN THE USA IS CARMEN SANDIEGO?** (Broderbund) Learn U.S. geography while you solve crimes. Follow 16 suspects through all 50 states using more than 1,500 clues. $49.95.
9	7	**DINOSAUR ADVENTURE** (Knowledge Adventure) Features photo-quality images, illustrations, and movies. The first disk-based PC product with a read-aloud book and a digitized speech story. $49.95.
10	-	**SPACE ADVENTURE** (Knowledge Adventure) With astronaut Buzz Aldrin's collaboration, this program features full-motion color video and stereophonic sound along with simulations. A look at rockets, space exploration, and even science fiction. $79.95.

Stocker isn't feeling the squeeze from DOS 6.0—not yet, anyway. Although Microsoft's forthcoming DOS 6.0 will include DoubleDisk compression technology for doubling a hard drive's capacity, Stocker 3.0 for Windows and DOS from Stac Electronics (800-522-7822, 619-431-7474) outsold Windows 3.1 and DOS 5.0 this month. Stocker 3.0 improves on earlier versions of the program by adding a set of real-time compression gauges, improving speed and compression ratios, and allowing greater customization of features.

Stocker 3.0 also supports larger disk capacities—up to 1GB, for a total of 2GB of addressable storage. The new Stocker Anywhere feature is also handy—it allows you to read and write stacked floppies and other storage media on any PC, even if Stocker isn't installed.

SOME PEOPLE THINK BUYING A PC IS A HIGH-STAKES GAMBLE.

WANNA BET?



MC Tower Chassis

MC Lo-Pro Chassis

MC Desktop Chassis

CUT THE RISK WITH COMPUADD'S NEW MC SERIES FOR "MISSION CRITICAL" APPLICATIONS.

THE "MISSION-CRITICAL" SERIES. Now CompuAdd gives you guaranteed security in your computer system, whether it's for a small-business application or a networked multi-node environment. The MC Series assures you of only the highest-quality PC components and provides the wide range of operating system coverage required by 32-bit operating systems.

YOU GET WHAT YOU EXPECT. From the motherboard to the hard drive to the video adapters, all the components of a specific MC system remain consistent from unit to unit. That means your months of evaluating a PC will never be in vain—you'll get exactly that system *every time*.

STANDARDIZED HARD DRIVES. Our MC Series uses only the best and most dependable hard drives, like Conner and Quantum. These drives must meet significantly higher standards for reliability, environmental conditions, compatibility, and more. You get the best components, in the best configurations, guaranteed.

EXTENSIVE EVALUATION. MC systems receive the same rigorous inspections all our PCs get—and then we test them some more! We run these systems as you would use them, in a "connected" environment. This extensive testing and run-in ensure you of a system that works first time out of the box and every time thereafter.

NETWORK CERTIFIED. Each server in the MC Series is Novell, Banyan Vines 5.0 and LAN Man network certified. Novell Netware Lite is installed, and Novell Network can even be preloaded—you'll only need a network card to get the system network ready. And, in partnership with Memorex-Telex, CompuAdd will now offer even more comprehensive PC and multivendor network assistance, such as global service, complete installation and configuration, a FastStart support program, and more!

4-HOUR RESPONSE TIME. Because some things are inevitable, on the MC Series CompuAdd offers the peace-of-mind of a four-hour on-site response time on service calls in 50 major U.S. metropolitan areas. And in most other market areas, next-day service is standard.

BEST SUPPORT IN THE BUSINESS. CompuAdd has the winning hand when it comes to other services also. 24-hour toll-free tech support comes free with all CompuAdd systems. We offer flexible limited warranties. Our toll-free, un-limited HelpLine is geared specifically to the concerns of first-time PC buyers. And our Direct Effect line lets you call toll-free 24 hours a day to have technical specifications on our systems faxed to you.

A 10-YEAR WINNING STREAK. While other computer sellers come and go, CompuAdd has been providing the best systems for the best prices for ten years now. So you not only get stability in your PC, you get stability in your PC provider.

CALL NOW. And your winnings are guaranteed!

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The Hot Stories of 1993—Readers Like Me Want to Know the Scoop

TO WRITE AN INTERESTING HIGH-TECH COMPUTER COLUMN, you've got to keep up with technological changes. And you've got to do more than read a lot; you have to find answers from the experts. But as a columnist, you can only touch on some of the information you discover this way. That leaves many answers to be fleshed out in full-length articles, by writers who specialize in the long feature story.

Although I seldom tackle features, I admire writers who specialize in them. As I write my columns throughout the year, I get ideas for long features but have nobody to assign them to. So I reckon I'll just toss these ideas into the public domain to see if anyone picks them up. These are all topics I want to read about. I have a feeling you will, too.

1. 8514/A—What Went Wrong? I'd like someone to explain why the 8514/A display standard never came to be. Chips & Technologies was banking on it with an inexpensive chip set. Pundits like *PC Magazine*'s Bill Machrone were hyping it, and the display looked pretty spectacular when I saw a demo. Furthermore, the only competition at the time was a nonstandard Super VGA and the inferior plain-vanilla VGA. So what happened?

2. Where Is the Audio on the PC? The situation with the audio on the PC is pathetic. While Sound Blaster is a cheap way to get fair audio from a PC, it's hardly the same as a built-in standard. Even the doggy old Amiga had digital stereo music from its inception a decade ago. The Mac comes with a microphone. The PC realm is plagued by competing standards, a situation that is further mucked up by Microsoft's own audio card. I'd like to see an analysis of this issue.

3. Kahn: The Early Years. While Billionaire Bill gets attention with a couple of unauthorized biographies, the more interesting character in the business is Philippe Kahn of Borland. Here's a guy who plays the sax, and was a shepherd or some such thing in France. How about some in-depth background about this industry character? What's his story? I'd be interested, and I'm sure others would, too.

4. Is There a New IBM? For months, news has been circulating about a "new" IBM and the changes going on there. Where's the definitive report on what is going on in this "new" IBM? Are the bureaucrats on the run? Who are the "new" players? I keep hearing about young guys, "like the ones they have at Microsoft," changing things. I want to know more.

5. Burst Mode In Ordinary Terms. Remember all the talk about "burst mode" in the 486? People would claim their machine was faster because theirs triggered burst mode more often. Explanations always seemed nebulous. Now I'm starting to hear that the processing power of the Pentium (Intel's 586) will depend on its burst mode. Hey, editors, how about one of those great *PC/Computing* illustrated explanations? Show a 486 processing data using burst mode compared to *not* using burst mode.

6. Voice Recognition—Today! Am I the only one who has noticed that voice-recognition technology now works? Many credit-card services use it for inquiries over the phone. Doctors use it in hospitals to write reports. IBM showed no fewer than four voice technologies and a slew of voice-input applications at Comdex. They were all stunning and worked in the noisiest imaginable environments. Even the new Lexus has a voice-recognition phone dialer! For some reason, people are still gaga over the hopeless pen-computing model of the future and are completely ignoring voice recognition. The real future now looks like voice. "Hello, computer!"

7. Japanese Failures in Microprocessor Design. My 15-year-old son casually asked me, "Why are the Japanese kicking our butts?" I inquired who told him this, and he intimated that it was a common belief at school. When I asked him in what field, specifically, the Japanese were "kicking our butts," he couldn't say. While the Japanese dominate in a few areas of commerce, they're hardly kicking anyone's rear end in most advanced technologies. In fact, as far as computers go, they've excelled only in making cheap memory, CD-ROM drives, and 3 ½-inch floppy drive mechanisms. Nothing would be as fascinating as an exploration of Japan's failure in the world of microprocessors. During the reign of the 8088, NEC came out with a line of Intel-compatible V-series chips. While the few lawsuits filed by both companies ended in a draw, I figured that NEC must have had enough knowledge to go forward with more advanced designs. What happened? It's time for someone to tell the story.

Hey, journalists! How about tackling these ideas for a change?

8. Object-Oriented Fantasy. I may write this one myself—that is, if *anyone* comes up with a consistent explanation of an object-oriented operating system and why anyone would want to use one. Given that the majority of people use computers for word processing and that current word processors are designed to be both powerful and closed, what will object-oriented anything bring to the party? I'm sure many people would like this explained.

So pay attention, computer journalists. Those are the eight hot topics I hope you'll explore this year. These ideas can yield much more interesting articles than more fluff about pen-based computing. Any takers? ◩

PHOTOGRAPH BY RUBEN ALFANADOR

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RAM	2MB to 10MB	1MB to 3MB	2MB to 10MB
Hard Drive	80MB	40MB	60MB
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Runs Windows	Yes	No	Yes
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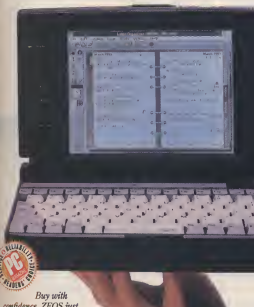

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YOU'RE IN BUSINESS.

Okay, maybe that's an overstatement. You have a job, right? You spend a lot of time having important interfaces with peers and superiors, ingesting vast amounts of coffee, playing Solitaire or Golf or, God help you, Tetris, and moving from place to place for meetings whose purpose later seems unclear. Now, this may look to the uninitiated like a pathetic waste of your life, but of course it isn't. It's simply your way of passing time between the Big Moments, when the whole salami is on the line: the critical pitch in which the entire quarter's revenues hang in the balance; the enormous budget meeting with guys who eat bigger fish than you for breakfast; the 30-page document you must produce overnight without *one single error* because Lazenby, who will review this ream of meaningless paper, is a stone cold maniac who polishes doorknobs before committing them to his palm.

At such times, the database must churn clean, the spreadsheet must complete its final iteration, the 68-slide screen show must *run*. And so, of course, it does not. Remember that floppy drive, the one you need to import the data that arrived from Accounting last night? You don't have it any more! Or perhaps your hard disk, ladies and gentlemen, fails to respond! Possibly—look!—you have no video! In short, you are toast. Your life is over.

You're going to have to dive into the box. This is no puny, pesky general protection fault, pal. This is the mother of all hardware issues. You don't have time to call Rashi the OEM, or Fritz the overpriced technical consultant, or even Furbish down in MIS to help resolve it. And no matter how many times you've done it before, the prospect of facing it again makes your head feel like it's wearing somebody else's hat, somebody small who sweats a lot. Not that you're a novice, not at all. There isn't a piece of software in existence you can't pound until it squeaks. But *this*... and with so much at stake. Calm down. Sure, it's going to be horrible. But you can minimize your discomfort and get the job done quickly and neatly if you follow these easy steps, gleaned over the course of this wonk's long career:

1. Getting In. Remove all cables, wires, and inexplicably snarled bushwah *before* you attempt to remove the computer's horny shell. And don't worry about tagging them or anything. You'll want to reattach them incorrectly when the job is done!

Given the state of contemporary design, your computer comes apart as easy as pie. On my tower, a couple of twists on the easy-access screws and the door opens wide, falls off, and won't go back on its tracks without extended, painstaking effort and some blind luck. Those with desktop cases report the body slides off as cleanly and uneventfully as powder off a baby's buttock—until it doesn't and just hangs there snagged on something. Relax, you'll gain entry eventually. Holding your machine over your head and shaking its guts out isn't going to make things go any more smoothly.

Many people leave the case screws lying all over the place, inevitably losing one or two. Make sure to put all your screws in one place, so you can you lose all of them *together*. Simple? You bet! Sometimes the best ideas are just common sense dressed up for Sunday dinner.

One final thing about case removal: Make things easy on yourself by ascertaining that you've removed *all* the screws. (By the way, that large box-like unit that just came thumping down is the *power source*. Put it aside. You're going to need it later.)

2. Ladies and Gentlemen, Start Your Engines. Okay, you're ready to get into the box now. But remember: *Never open a computer at all unless your fingers are massively fat!* Fat fingers help you gain maximum access to the tender innards and show them who's boss!

Look inside now. See how essentially *simple* a computer is, really? I mean, when you get right down to it. Well? Hello! That's fine. Feel free to sit there and stare at it for a couple of hours. You've only got a deadline in 82 minutes.

Things are going great. You're in there checking for what's seated firmly and what isn't. As you remove fastenings, replace internal batteries and other stuff, note that many tiny clips, screws, and gizmoids are falling into the bowels of the machine. This is quite natural and nothing to worry about. You can retrieve all of them with a powerful magnetized screwdriver later, right? Sure!

3. On the Job. Now let's attend to that pesky problem, whatever it may be. Let's say, for example, that your floppy-drives are fried. Here's what you do: Roll up your sleeves and begin to mess with the cables between the drive and its controller, which is inevitably sandwiched between several long, flat, gnarly projectiles covered with sharp metal objects and dust balls. As you remove the controller, be careful to avoid dripping blood on the motherboard. She doesn't like it. Once you're satisfied that the cables are correctly seated on the card, replace it in its slot. When it refuses to go back in where it seemed so at home before, pound it mercilessly into place with your fist, screaming, muttering imprecations, and, if no one is about, weeping and cursing fate. If this fails, get a hammer and screwdriver and just make that baby go in! There! Doesn't it feel great to have your destiny in your own hands?

This is no memory conflict, pal. This is hardware hell.

PHOTOGRAPH BY RICHARD NORDGAARD

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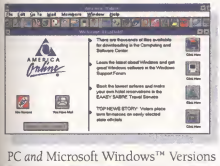

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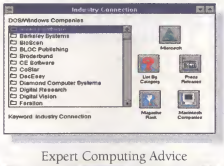

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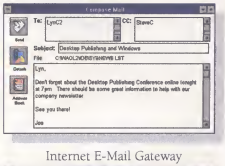

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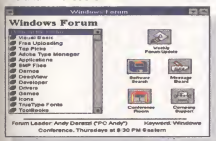

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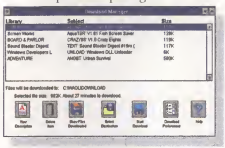

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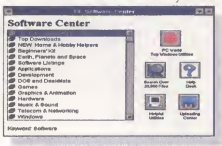

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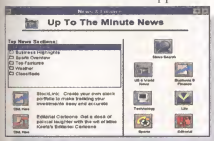

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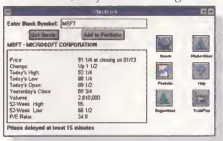

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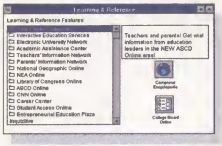

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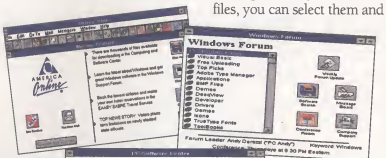

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If, however, the problem is something simple and obvious, like the failure of an internal battery that completely disables your CMOS setup and renders your 486 less useful than a plucked chicken, simply take your brand new battery in hand and find where it goes inside the case, according to the documentation (which, of course, you have right there). Plug the frisky little doodad into the flange on the system board that's there under four razor-sharp overhangs and *voila*!

The same goes for just about any challenge you can think of. This isn't rocket science! Just calmly, patiently target the problem and solve it. And by the way, pulling out the power cord and putting it back in again while making those last-minute tests can get really tedious. So if you want to keep the system running, go ahead, but be careful. If you're careful, nothing really bad can happen, right? Right? Wow! What's that burning smell? Could it be . . . you, you big dumb jerk?

4. Mopping up. Now you're almost done. Before you close that box, be certain that all the ribbon cables leading to the floppy drive bays are in *upside down*. This should be no problem whatsoever. Do it right, and you can have the fun of removing the case another time to solve the *new* problem you've created.

Now the box. If it refuses to sit right, bash it a few times with your fist. Take another Prozac—and you're done! Slam out that hard copy, process that final revision, and hit the ground running, in time to make history for your department, yourself, and your loved ones!

You did it! You're a hero! You've been inside the belly of the beast—and lived to tell the tale!

And . . . it wasn't so bad, was it? Next time, you won't be such a wimp about it, will you? You'll even sort of look forward to it, won't you? Sure! You're tough and courageous! You're willing to do what's necessary, no matter how disgusting or unnatural it may be, and never once ask yourself whether things could've gone easier if anybody, anybody at all, had thought for one single teeney-weeney moment about *you*!

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A Modest Proposal: How IBM Can Rescue Itself from the Abyss

IT'S BEEN A LONG TIME SINCE EVERYONE CALLED COMPUTERS "IBM machines" and punched data on "IBM cards." Many of you don't remember those "good old days" when IBM and its mainframes ruled the roost. But IBM remembers them well—it has managed its business as if Microsoft, Intel, and 75 million networked PC users didn't exist.

IBM's stock crashed last year when Chairperson John Akers announced the company's third-quarter results. But the stock didn't fall just because its $86 million quarterly operating profit was less than half the amount the company had forecast, or because the $2.78 billion overall loss exceeded the red ink of any U.S. corporation that quarter. Disastrous financial results are nothing new to IBM or its stockholders. Akers' explanation of the results, however, *was* new: He explained that the poor financial showing resulted from global economic conditions that had reduced demand for IBM's mainframes. Apparently, no one at IBM or in the stock market noticed as the rest of the computer industry turned to PCs and enjoyed rapid growth. Nor did they notice that IBM's share of PC unit sales went from about 85 percent in the mid-1980s to less than 10 percent in 1992. Or at least no one worried about it.

The crash didn't surprise anyone in the computer industry, but it shocked Wall Street, pension-fund managers, and IBM retirees, who watched their IBM portfolios shrink by half in a few days. IBM has contributed much to the development of computers, and it could deliver much more if it survives. Since IBM's demise could hurt us all, every effort should be made to save this important institution.

Teetering on the Brink

Rescuing IBM from the abyss sounds like a tall order. After all, it's one of the largest, most complex corporations in the world. But if you accept the idea that IBM's basic problem is that it's been heading in the wrong technological direction, then a few simple changes can go a long way.

None of these efforts will succeed without change at the top.

The company has already announced plans to discontinue mainframe research—the first step in winding down that end of the business. It should also stop manufacturing them and meet the ongoing demand for leased mainframes from existing inventory. Minicomputers should also be left behind; the company should wind down the AS/400 product line during the next two to three years.

To its credit, IBM has launched two excellent low-cost, high-performance PC lines: the PS/ValuePoint and the PS/1. But IBM should merge these essentially identical computers and integrate its marketing and distribution strategies. At the same time, the company should abandon what's left of its Micro Channel architecture strategy, which confused buyers by offering them incompatibility without redeeming benefits. IBM's engineers should leverage their renewed position in the ISA-bus market by adding Intel's PCI local bus for video, disks, and other peripheral gear.

Power PC to the People

At the same time, IBM should raise its profile in the high-performance Intel-compatible business. IBM has launched the 386SLC and 486SLC and has more products ready for release. It should renegotiate its license with Intel, which restricts Big Blue from selling processors not installed in IBM motherboards. IBM should also push its performance-winning PowerPC processor, the first RISC chip designed from the ground up for desktop PCs, into the mainstream. With the right software and marketing, the PowerPC could give Intel's *x*86 lineup a tough time.

Launching PowerPC will require IBM to put its MicroKernel-based operating systems on the market, which in turn requires that both the Intel and the PowerPC version of the new system be launched earlier than scheduled. IBM should give up on OS/2 2.1 and reallocate its technical and marketing resources on behalf of the MicroKernel versions of OS/2, AIX, DOS, and whatever else it can port to the new system. And IBM must rally the software-development community to the new platform so that new applications are available on time.

None of these efforts will succeed, however, unless IBM changes at the top. Akers has lost all credibility—it's a good thing he's leaving. General Motors' board went the distance with Roger Smith, but GM continued to flounder; only after Smith retired did the GM board lose patience with management and send Chairperson Robert Stempel packing. Yet Stempel never had a chance, because Smith had simply done too much damage.

IBM's board must act faster than GM's did. And Akers' successor should be given a lot of leeway to fix the company. The right person must know IBM thoroughly, yet understand the PC business well enough to get IBM on the right track. This excludes many outsiders, but leaves former insiders like George Conrades in the running. Conrades—who was derailed last year in his pursuit of the chair—would be a great choice, even though bringing him back might be politically difficult. Whoever becomes the new chair must have the authority and the political clout to bring the company's culture, as well as its business, into the '90s. And that will be the most difficult job of all. ◪

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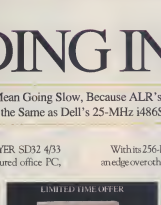

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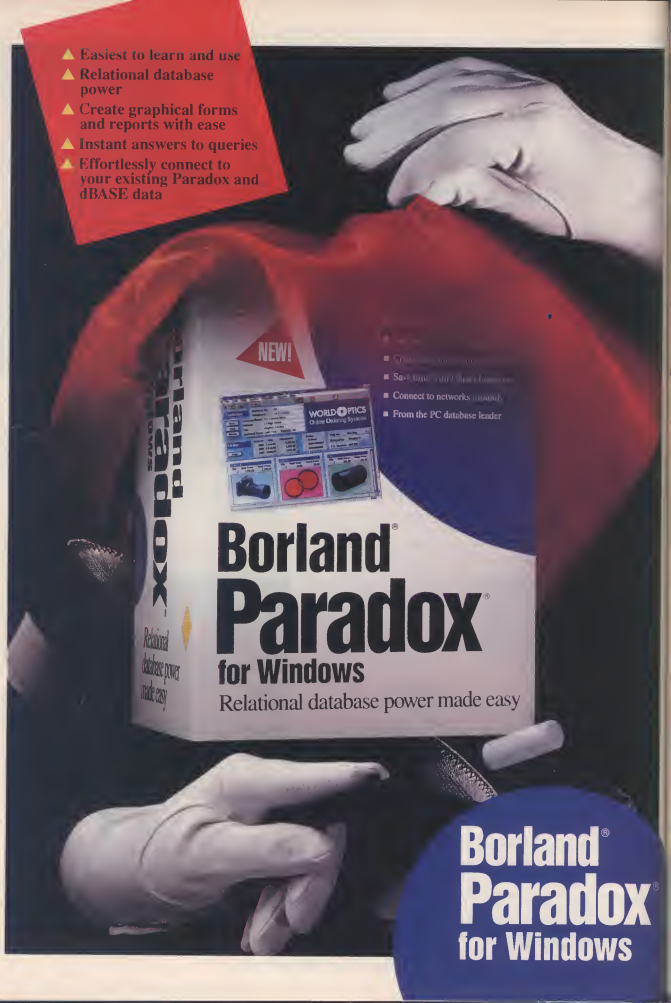
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Backing Up Isn't Hard to Do When You Do It the Right Way—Our Way

QUICK, WHAT'S THE MOST VALUABLE PART OF YOUR COMPUTER? Your CPU? Your fancy VGA monitor? Wrong and wrong. The part you'd most hate to lose is your data. But if you're like most users, you leave your precious files unprotected. And you probably also lack perfect archive copies of all your files. John and Paul explore the paradox.

PHOTOGRAPHS BY RUBEN W. NAVARCK AND RICHARD MORGE ©1993

SOMERSON: People just don't get it. They spend five grand on a killer system but won't pony up the few hundred bucks for a tape backup. Network administrators discourage backing up to the network so that they can be cheap and avoid buying big hard disks for the servers. Microsoft tosses a slick third-party backup program into DOS but forces users to dump their data on floppies. It's nuts. Are *you* totally backed up, John?

DVORAK: Wow, Paul, we've really sunk to the bottom: We're talking about backing up. You know, at first I thought this was a pretty lame idea. But after thinking about it, I realized that people *have* been lax about backing up.

SOMERSON: It's sad but true—I don't know anyone who is totally backed up. Users seem to regard those who are as anal and compulsive. Years ago, the technology was flaky, expensive, and a real pain. These days, like everything else, it's cheaper and more reliable. But only 7 percent of all users own tape drives.

DVORAK: It doesn't make any sense when you can get a decent backup system so cheaply. I actually back up onto a pricey but cool Maynard digital audio tape backup system that runs under OS/2. It conveniently backs up every other day in the background.

SOMERSON: Maynard's system is nifty, but I prefer Colorado Memory Systems' affordable products (so does Hewlett-Packard, which recently bought the company). One of them simply plugs into any parallel port, so you can carry it around an office and back up each system. It's also ideal for backing up notebooks. Still, for most users, the process is like going to the dentist—it's too easy to put off.

DVORAK: I think the inconvenience makes people procrastinate; so does the fact that most PCs are pretty reliable. I've been using them for more than 16 years (yikes!) and have never lost a hard disk and had to rely on the backup. But I don't use a machine for more than a couple of years. And it's not because I get free loaners—I own a few machines, and they've never lost a hard disk. Heck, I still travel with a TI 2000 laptop I've had for three or four years. The thing has an old clunker of a 20MB hard disk, and it has literally been around the world—I've even dropped it a number of times—and yet it still works! How can you convince people to back up with machines like that?

SOMERSON: Maybe you're lucky. Or maybe vendors send you hand-tuned hardware. Or perhaps you try so many PCs that you don't exercise any one system long enough.

The only real protection is a good, current backup. It also saves you when DOS lets you do stupid things like copy an older version of a file over a newer one and use the wrong wildcard COPY syntax to concatenate all your files into one unintelligible mess.

I've used my share of systems over the past decade and crashed half a dozen hard disks. The 300MB Northgate system in my office is sputtering out "General failure error reading drive C" messages as I write. What's especially annoying is that both the MIS repair crew and I have run all the standard disk-diagnostic programs, which churn and churn and then erroneously crow that they've either detected nothing wrong or found some bad sectors and fixed everything. But as soon as I reboot, the same error messages reappear. And some of these clunker diagnostic programs take all night to run.

DVORAK: I don't think a clone vendor has a lot to do with the quality of the disk drives that are thrown in. Give me a break. Hand tune? You're collecting cars again, eh? Anyway, backing up most systems *is* inconvenient.

SOMERSON: Actually, backing up is a snap with the right software, if you don't mind leaving your system on all the time. Just snap in a tape, and launch the whole process with a batch file as you leave your office each night. So why don't more people do it?

DVORAK: Most people don't have the tape backup. In large

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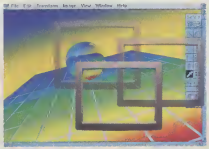

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offices, they usually move some sort of portable system from machine to machine, so the overnight idea is problematic. With new, large hard disks it may take a couple of tapes to do the job. So much for overnight backup.

SOMERSON: Wrong. Smart users back up just their new and changed files each night, not the whole volume.

According to Novell, between 40 and 45 percent of all systems are networked. The easiest thing to do is to back up data to the server. But network administrators hate this option because it means they have to buy monster drives. You'd think these control freaks would love getting their hands back on everyone's data and then stepping in heroically when a user loses everything.

DVORAK: You'd be surprised how many people don't have a clue about backing up the office machine—no one tells them to do it. On the other hand, there are those who sneakily back up to the server, clogging the server drive to the max. This is actually a good argument for a diskless workstation. Do everything off the server, and make the network administrator back up nightly. Just like in the old days.

SOMERSON: Diskless workstations? Users don't want to give some arrogant, inaccessible wonk control over their work. That's why the PC revolution started, remember?

Connectivity is more than just e-mail, site-licensed applications, and group printers. Sharing resources also means giving everyone access to things like fax boards, CD-ROM jukeboxes, and massive hard disks for backups.

With GUIs becoming standard, most users find themselves stuck with mountains of data. And it's not just graphics files that clog hard disks—uncompressed apps delivered on a dozen floppies eat up 20 or 30 megs. Even *games* can scarf up well over 10MB. Data-compression programs help, but the real answer is to buy giant hard disks.

In fact, the easiest archiving system of all is to use two large hard disks with mirroring software that duplicates everything onto the second drive. If one hard disk fails, you replace it and back up from its twin. But if the system that has both drives is stolen or destroyed in a fire, you're sunk.

If you want to talk about a new technology that may actually turn a profit, consider this: A handful of companies may solve the backup problem once and for all. They send you a high-speed modem and superfast communications software to match. Then they back you up to a master offsite disk farm over clean telephone lines. I'd be a little skeptical about security and data integrity, but they claim you can jump in via modem anytime and inspect your files.

DVORAK: Talk about off the wall! Sounds like the same company that will freeze your head after you're dead, just in case in some distant future they find a cure for what killed you. First, assuming these people do the job at all, I'd want to be sure my files were encrypted. I don't want strangers looking at my notes. Second, the rule of thumb for estimating the true speed of a file transfer is that, using Zmodem, it takes 10 seconds to transfer 10K. That means a 500MB hard disk would take about 8,333 minutes, or nearly 140 hours of modem time, to upload the data. A 1GB disk would take around 270 hours, making it impossible to use for daily backup. Say we doubled the speed and added compression, it would still take 50 to 100 hours to back up a gigabyte. This sounds like an operation the phone company thought up to make more money!

SOMERSON: John, I think they froze your head already. These companies don't use Zmodem at some rinky-dink baud rate; that would be like sending everything in Morse code over two dixie cups and string. Instead, they compress the bejeezus out of your data (and encrypt it at the same time), back up just the important files (so they aren't copying COMMAND.COM and all your fonts every day), and blitz it out at superhigh speeds over noise-free lines.

DVORAK: I love you, too, Paul. But it's pretty hard to compress beyond what compression experts already accomplish with today's modems. How do *you* back up anyway, Paul?

SOMERSON: First, I use a batch file that runs XCOPY to back up everything with today's date stamp onto floppies. Second, I schlepp a notebook between work and home, and copy all my data directly onto and off of it so that all my important, current files are in three places (office system, notebook, home system). And I use a Colorado tape drive regularly to back up my whole hard disks. What about you?

DVORAK: As I mentioned, I'm currently using a Maynard Maynstream DAT running under OS/2 on one machine, an inexpensive and reliable Summit tape on a Windows machine, and a 1GB Tahiti optical drive on a Macintosh. I'm most impressed with the Tahiti drive, because it acts like a large hard disk and can actually replace the hard disk if the hard disk fails. On the other hand, the Tahiti costs a couple of thousand dollars, although mine is a reconditioned unit available for $1,200 or so. The 150MB Bernoulli drives would be good online backup for people who have systems that must stay up if a hard disk fails, but the newest strategy is simply to mirror your hard disk with a second hard disk. New IDE controllers will do this for you.

Protecting data is cheaper and easier now, but only 7 percent of users own tape drives.

SOMERSON: I like the fast random-access aspect of optical, too, but big ones cost more than my entire system. Mirroring to a twin disk is trivial; you can do it with DOS commands. But if you're smart about backups, you should copy your data offsite, not onto the next drive bay. And Bernoullis (especially the latest generation) are time-tested and effective. But face it, tape is so cheap and easy that everyone should use it. This solid, low-tech solution is best for most users—at least until optical prices descend out of the stratosphere.

DVORAK: I agree. People should buy a tape backup unit today! As for optical costing more than your entire system, I think you should upgrade your system or redo the math. As for offsite storage, give a tape to your mom.

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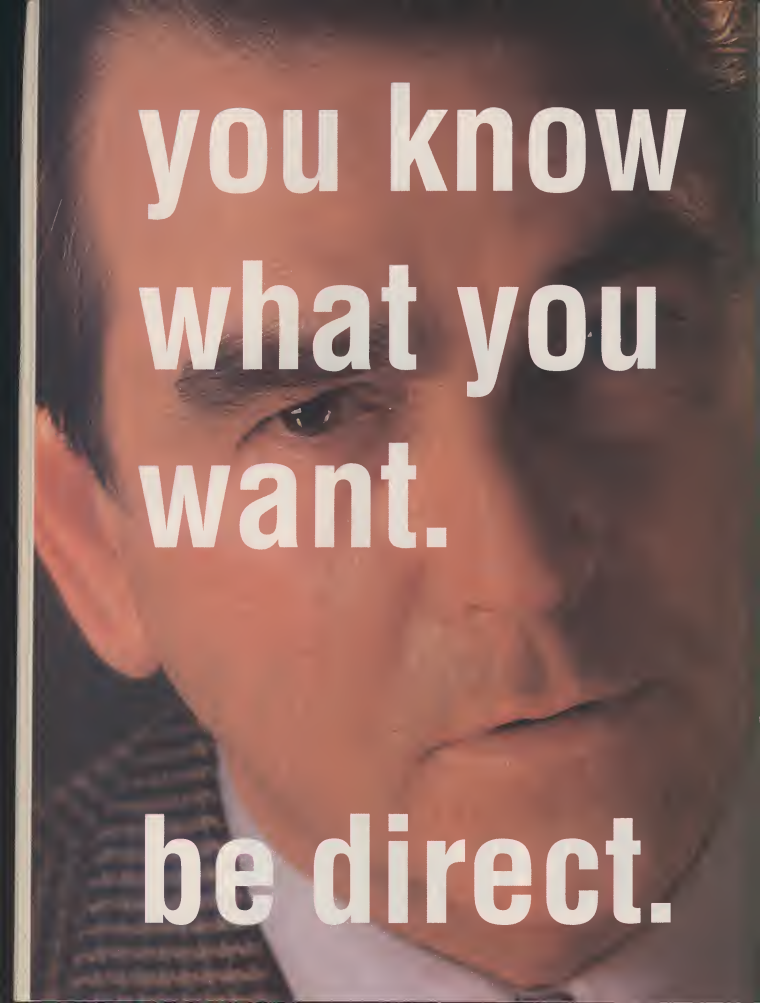
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But perfect techs and specs are only half the story. These new upgradables are designed, built, sold and serviced by Digital. Which means you get first-party, manufacturer-direct service. Networking capabilities of a company that pioneered Ethernet. And optional multivendor service so broad, it includes more than 8,000 hardware and software products from 800 manufacturers.

At Digital, *direct* means much more than direct selling.

It means **direct service.** The kind that goes beyond mere maintenance to become an integral part of your business.

Start with on-site service, performed by our own 10,000 person service force which includes more Novell® certified engineers than any independent service vendor ever dreamed possible.

In fact, Digital has service plans for every product we sell, from desktop PCs and printers to deskside systems, notebooks, and more.

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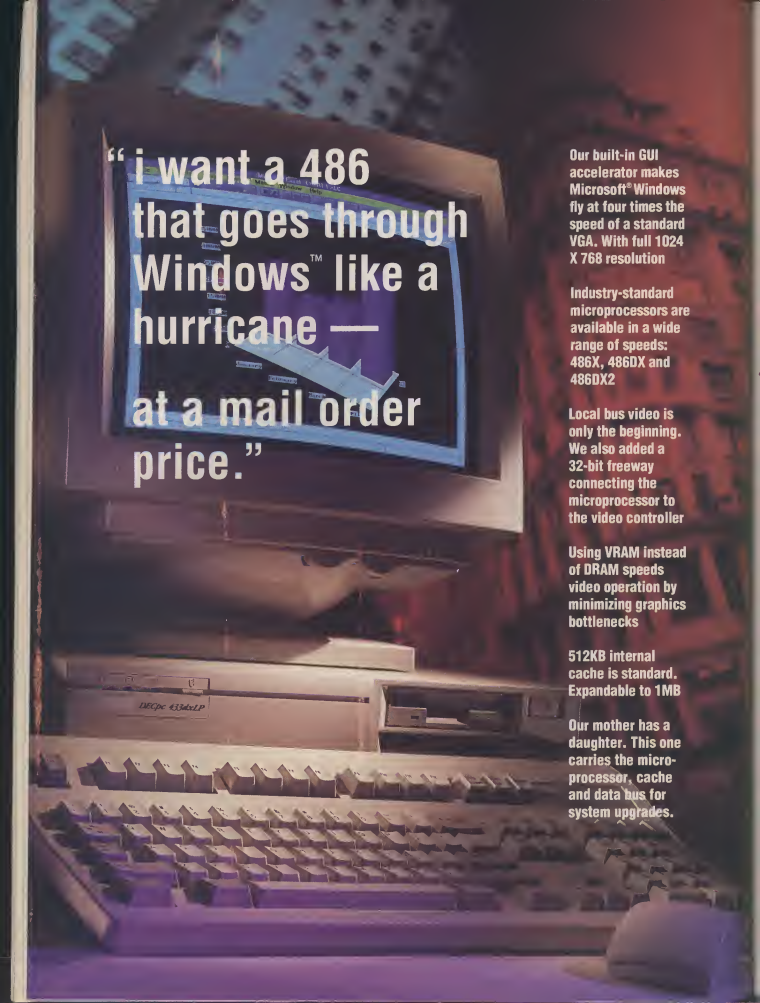
Circle 130 on reader service card.


"i want a 486 that goes through Windows™ like a hurricane — at a mail order price."
Our built-in GUI accelerator makes Microsoft® Windows fly at four times the speed of a standard VGA. With full 1024 X 768 resolution
Industry-standard microprocessors are available in a wide range of speeds: 486X, 486DX and 486DX2
Local bus video is only the beginning. We also added a 32-bit freeway connecting the microprocessor to the video controller
Using VRAM instead of DRAM speeds video operation by minimizing graphics bottlenecks
512KB internal cache is standard. Expandable to 1MB
Our mother has a daughter. This one carries the micro-processor, cache and data bus for system upgrades.

> **"Dollar for dollar, the DECpc 433dx LP is one of the best computing systems you can buy."**
>
> — *PC Computing*, January, 1993

Pick your brain. Or expand it.

Our industry-standard Vacancy Socket lets you upgrade your DECpc to reach full 486DX2/50MHz or 486DX2/66MHz performance. Just snap in the appropriate Intel™ OverDrive™ chip.

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But before we get ahead of ourselves, Digital's upgradable LPs, with 486SX, 486DX and 486DX2 industry-standard microprocessors, are available in a wide range of speeds.

So you can choose exactly what you need now. And grow when you're ready. There's room to add up to 64MB RAM on our mothercard. And these DECpcs not only come with a 128KB cache standard — with room for up to 256KB — *it's writeback cache* ... the single most advanced memory-caching strategy available.

In other words, to give *your* imagination the tools it craves, Digital engineered flexibility into our upgradable Desktop family every step of the way.

Benchmark Tests: The DECpc 450d2 LP

We tested the clock-doubled 50-MHz DECpc 450d2 LP, one of six machines in Digital's new DECpc LP series, and found that its implementation of local-bus video yields outstanding results on our Graphics Winmark benchmark test.

We used PC Magazine Labs' Hardware Performance Tests, Release 6.0, to measure each PC's performance. The Graphics Winmark is the geometric mean of 12 Windows-based graphics tests from WINBENCH 2.5, weighted to reflect how frequently various functions are used.

Higher scores represent better performance.	Processor (operations per second)	Memory (kilobytes per second)	Disk (kilobytes per second)	Video (thousands of operations per second)	Graphics Winmark (megapixels per second)
DECpc 450d2 LP (486DX2/50)	506	5,606	193	2,182	12.98
50-MHz 486DX2 average	487	5,430	276	2,539	5.51
Dell System 486D/50 (486DX2/50)	450	5,525	241	4,272	1.58

PC Magazine November 24, 1992

Circle 140 on reader service card.

DECpc 433dx LP
i486DX 33MHz System
• 128KB Writeback Cache
• 4MB RAM
• 122MB IDE Hard Drive
• 14" VGA Color Monitor
• 3.5" 1.44MB Floppy Drive
• Keyboard and Mouse
• MS-DDS 5.0 & Windows 3.1
$2,199

DECpc 450d2 LP
i486DX 50MHz System
• 128KB Writeback Cache
• 4MB RAM
• 122MB IDE Hard Drive
• 14" VGA Color Monitor
• 3.5" 1.44MB Floppy Drive
• Keyboard and Mouse
• MS-DDS 5.0 & Windows 3.1
$2,349

DECpc 466d2 LP
i486DX2 66MHz System
• 128KB Writeback Cache
• 4MB RAM
• 122MB IDE Hard Drive
• 14" VGA Color Monitor
• 3.5" 1.44MB Floppy Drive
• Keyboard and Mouse
• MS-DDS 5.0 & Windows 3.1
$2,549

Leasing available – call for information

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DECpc 325SL: the notebook that upgrades as fast as your workload.

The DECpc 325SL Series Notebook gives you the power, memory, expandability and full upgradability of a desktop PC. In fact, this 5.9 pound, fully loaded road warrior actually converts to a desktop model in less time than it takes to brew your morning cup of coffee.

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It's the only notebook you'll ever need. *It may be the only* PC *you'll ever need.* Consider this: the DECpc 325SL Notebook comes standard with 25MHz, 4MB RAM, 64KB cache, and an 80MB IDE hard disk. As your needs grow, just upgrade the processor from 386SL to 486SL, the display from monochrome to passive or active matrix 256-color, the hard disk from 80MB to 120MB and the RAM from 4MB to 8MB, 12MB or even 20MB. And you no longer have a simple notebook, you have a top-of-the-line, full-power PC that travels.

Plus, the DECpc 325SL is one of the first notebooks to offer two industry-standard PCMCIA expansion slots. Just snap in a credit card-size data/FAX modem, an Ethernet card or a SCSI adapter, and the DECpc 325SL Notebook becomes as versatile as the best equipped desktop PC.

DECpc 325SL Docking Station. Take your Notebook as far as it'll go.

Bring your Notebook up to full desktop performance by adding the DECpc 325SL Docking Station. The Docking Station expands notebook I/O option card capability, so you can take advantage of a wide array of desktop peripherals and storage devices. It also lets your notebook communicate effortlessly with desktop PCs and workstations (via the optional Ethernet controller card), and creates PCSA (Digital's Personal Computing Systems Architecture) compatibility.

•Digital has just the right portable or transportable printer to accompany your DECpc 325SL Notebook. (Leasing available — call for information).
•Warranty coverage may be extended with one- or two-year Return-to-Factory Contract Extension. •Warranty coverage may be enhanced with DEC Passport Service.

DECpc 325SL Notebook
Base System
• i386SL 25MHz System
• 4MB RAM
• 80MB Hard Drive
• LCD VGA Super Twist Sidelit Display (64 grey scale, 9.5" diagonal)
• 3.5" 1.44MB Floppy Drive
• Removable trackball
• 6.5 hour battery
$2,399

DECpc 325SL Notebook Plus
• i386SL 25MHz System
• 4MB RAM
• 120MB Hard Drive
• LCD VGA Super Twist Sidelit Display (64 grey scale, 9.5" diagonal)
• 3.5" 1.44MB Floppy Drive
• Removable trackball
• 6.5 hour battery
$2,599

DECpc 325SL Color Notebook
• i386SL 25MHz System
• 4MB RAM
• 120MB Hard Drive
• 256-Color Passive Matrix Display
• 3.5" 1.44MB Floppy Drive
• Removable trackball
• 6.5 hour battery
$3,399

DECpc 325SL Docking Station
• One full and one half-length 16-bit IBM PC/AT option slot
• One slim-line and one half-height 5¼" drive bay
• Serial communications port
• Parallel printer port
• External PS/2 keyboard port
• External PS/2 mouse port
• External VGA monitor port
• Auto-sensing 115-230V power supply with battery charger
• IEC auxiliary AC power outlet
$379

we've got another advantage built-in

Every Digital desktop product comes with two other important engineering differences. Digital is one of only a handful of companies in the world to build PCs in an ISO 9000-compliant factory. And every Digital desktop product is network tested with every other industry-standard machine available, from IBM® PS/2® and OS/2® to COMPAQ® SunWorkstations® and Macintosh®. We use the 70,000+ node network that runs our company to test our PCs. We even test applications between networking configurations.

NETWORK CERTIFIED

> **"Who'd have imagined a year ago that you could get as much performance and as crafty a design as you'll find in the DECpc for under $2,500?"**
>
> — *PC Computing*, January 1993

PC WEEK LABS

Scoreboard

Based on a scale of 1-5 (5=excellent)		Advanced Logic Research Inc. *Flyer 320T 40X/33*	AST Research Inc. *Bravo 4/33 Model 1238*	Dell Computer Corp. *Dimension 486DX/33*	Digital Equipment Corp. *DECpc 433dx LP*	IBM PC Co. *PS/1 Model 2155-S76*	Zenith Data Systems *Z-433DX Model 200*
Overall weighted score		3.6	3.5	2.4	4.0	2.8	3.4
1. Price vs. performance	(30%)	4	4	2	4	3	4
2. Performance	(25%)	3	4	2	4	3	3
3. Expandability	(25%)	4	3	3	4	2	3
4. Serviceability	(10%)	3	3	2	4	3	4
5. Quality of construction	(10%)	3	2	3	4	3	3

1. Overall performance relative to cost (comparative among these six machines). 2. Overall comparative system performance in all tests. 3. Support for processor, memory, storage and expansion board upgrades. 4. Ease of processor, memory, storage and expansion board upgrades. 5. How well the system is assembled (including case design, power supply and tools required for assembly).

Here's what else you get with every Digital Desktop

- Factory Installed MS-DOS and Windows 3.1
- 30-Day Money-Back Guarantee
- One Year On-Site Service
- Lifetime Technical Support
- 24-Hour FAX Support 800-524-5694
- Free Shipping

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Circle 167 on reader service card.

A Better Windows Than Windows

Power Launcher

Tackle file management, program launching, task switching, and more with 55 utilities that blast through Windows' performance barriers.

Squeegee

System Engineer

BY BARRY SIMON

Print Cache

THE MORE THINGS CHANGE, the more they stay the same. Anyone who's abandoned the DOS command line for Windows' menus knows you need utilities in Windows just like you did in DOS. File Manager needs a file viewer. Print Manager needs to run faster. Windows' INI files could be a lot easier to edit (and there should be a quick way to restart Windows after you've changed an INI setting). And, though Windows 3.1's disk cache is finally among the ranks of the best third-party products, Windows offers no diagnostic, backup, or antivirus features.

It's no wonder that third-party utility makers are flocking to fill in the gaps, and it's no wonder that choosing among all the different Windows utilities can be more time-consuming than buying a car. How does a standalone File Manager replacement utility compare with the file-management capabilities of Central Point's PC Tools for Windows, Symantec's Norton Desktop for Windows, and Fifth Generation's Direct Access Desktop for Windows? Which of the 40-plus available program launchers will let you keep a history list of the File, Run command? And what's available in shareware?

In the following pages, we present first the Windows way to handle 13 tasks, from managing files to launching programs, and then the better way—how the best third-party utilities tackle the same tasks, complete with our experts' recommendation for which single utility performs a specific task best. With this collection of powerful utilities, you'll end up with a much better Windows than Windows.

All the shareware featured here is available on PC/Contact, *PC/Computing*'s online service (filenames are printed with the address of the author), or on disk for $29.95 from Public Brand Software, P.O. Box 51315, Indianapolis, IN 46251, (800) 426-3475. Ask for *PC/Computing*'s Better Windows than Windows disk.

Barry Simon is a Los Angeles–based freelance writer and a contributing editor to PC Magazine *and* Windows Sources.

Scrapbook

Automating Repetitive Tasks

THE WINDOWS WAY

Unfortunately, Windows doesn't include any counterpart to DOS's primitive batch language for automating repetitive tasks. Its keyboard macro program, Recorder, lets you create macros, but it won't let you edit them, and the macros cannot accept user input.

THE BETTER WAY

A wide variety of third-party Windows automation tools exist, including two macro programs (ProKey and Tempo), two versions of the REXX batch-type language, and several batch languages, schedulers, and event handlers. Also, Synergy, Norton Desktop, and PC Tools for Windows all come with batch languages.

- **CE SOFTWARE'S PROKEY FOR WINDOWS 1.0** is basically a souped-up version of Windows' Recorder. You record scripts as sequences of actions—for instance, starting a program, moving the mouse, pressing keys, and choosing an item in a dialog box. It allows only rudimentary editing: You can go into debug mode and play back actions one at a time, deleting and adding actions as you like, but you can't edit code like you can in WinBatch or Power Launcher. Since single keystrokes are recorded as separate actions, editing text can be very tedious.

  While recording, you can ask for user input, but you can't automatically insert the current date or time as you can with the DOS version. While superior to Recorder, ProKey is often awkward and shows its Version 1.0 status. We're eagerly awaiting CE's next release of ProKey (1.1), which should be available by press time.

  PROKEY FOR WINDOWS 1.0, $99• CE SOFTWARE• • 1801 INDUSTRIAL CIRCLE• WEST DES MOINES, IA 50265• (800) 523-7638, (515) 224-1995

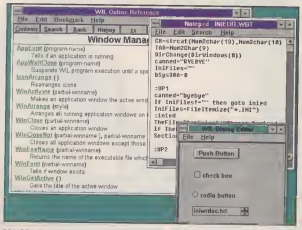
- **WILSON WINDOWWARE'S WINBATCH 4.0** shareware program is a full-fledged batch language with GOTOs and if-then-else statements. It includes variables with arithmetic, so you can code the equivalent of a FOR loop. The utility's Windows Interface Language (WIL) provides considerable control over Windows programs. You can send keys to programs, change the size of a program's window, change title bars, and hide or close programs. WinBatch can accept user input via simple edit boxes or complex dialog boxes that you create with a dialog editor. (Norton Desktop includes WinBatch 3.0's version of WIL, which lacks Version 4.0's dialog editor and two dozen new commands.)

  WinBatch lets you record only keystrokes, so for most operations, like launching a program or entering the current date, you need to write actual batch-file code. A developer's version is available for compiling batch files.

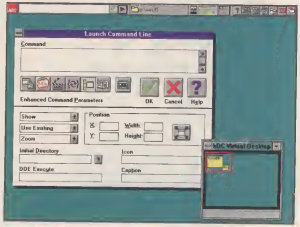
  WINBATCH 4.0, $69.95 AS SHAREWARE; $395 WITH WINBATCH COMPILER (NONSHAREWARE)• WILSON WINDOWWARE • 2701 CALIFORNIA AVE. SW, SUITE 212 • SEATTLE, WA 98116 • (800) 762-8383, (206) 938-1740 • ON PC/CONTACT. WINBAT ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

A BETTER WAY TO AUTOMATE TASKS

If you're into batch languages, you'll love **WinBatch**. And if you're willing to trade branching for ease of use, you'll find **Power Launcher** a pleasure.



WINBATCH's WIL language gives you control over Windows programs, but it lets you record only keystrokes. So for most operations you'll write real code as shown here in Notepad.



POWER LAUNCHER lets you create scripts by pressing keys, using the mouse, pressing button bars, choosing items in a menu, or typing commands. You'll rarely need to write code.

• **HDC'S POWER LAUNCHER** also includes a powerful script language. You can record scripts by pressing keys, using the mouse, pressing button bars or choosing items from a menu attached to any application, or typing actions on a command line. The syntax is obscure, but you'll rarely need to write code since you can record so many actions. The graphical script builder is wonderful—if you want to launch a program, you just choose it from a pick list. If you want the script to use a program that's already running, just choose the program from a dialog box with a drop-down list of choices. Basically, the script builder lets you create code by choosing English-language options from dialog boxes.

Power Launcher's scripts can manipulate programs in many ways, but there is no branching (if-then or do-while loops) or variables. The program accepts user input and date and time stamps.

POWER LAUNCHER 2.0; $99.95 • HDC COMPUTER CORP. • 6742 185TH AVE. NE • REDMOND, WA 98052 • (800) 321-4606, (206) 885-5550

Managing the File System

THE WINDOWS WAY

If you've experienced DOS 4.0's Shell, Windows 2.x's Executive, and Windows 3.0's File Manager, you'll think the Windows 3.1 File Manager is great—at least it gets the feel and basic functionality right. But it still lacks important features. You can't display files from several directories or display several disks in one window. You can turn on a file's hidden attributes, but then you can't see the file anymore! Most important, file searches can be based only on filenames—not contents—and cannot be performed across drives.

THE BETTER WAY

More than a dozen File Manager replacements are on the market, but three stand out for their combination of viewers, search capabilities, and ease of use. All feature the split tree/directory windows that File Manager uses, and XTree also includes directory-only windows.

• **SYMANTEC'S NORTON DESKTOP FOR WINDOWS** integrates file management into the desktop itself, so, for instance, disk icons are displayed along the side of the screen. Double-click on one, and you get a directory/file display. You can then open a view panel or run a file viewer as a separate full-size window. You can even save a file view as an icon and view several files at once.

Norton's SuperFind feature lets you search for files by drive (for example, all local drives or all network drives), date, time, or a text string, within files. You can also save search setups for reuse.

NORTON DESKTOP FOR WINDOWS 2.0, $179 • SYMANTEC CORP. • 10201 TORRE AVE. • CUPERTINO, CA 95014-2132 • (800) 441-7234, (408) 252-3590

• **CENTRAL POINT'S PC TOOLS FOR WINDOWS** clearly has an eye on Norton Desktop, so it includes most of Norton's file-management features and then some. And since many Norton Desktop users complain that Norton's drive icons get in the way, PC Tools places them in a window that you can minimize.

Like Norton, PC Tools lets you search through a directory for a filename by keying in the first letter or letters of the filename, and its Smart Find feature offers the same flexibility as Norton's SuperFind. PC Tools also includes esoteric but useful file utilities. One such utility keeps two directories in sync, ensuring that the most recent version of a file is written to two different directories, which is useful if you copy a file from your hard drive onto a floppy disk for use with a laptop.

PC TOOLS FOR WINDOWS 1.0, $179.95 • CENTRAL POINT SOFTWARE • 15220 N.W. GREENBRIER PKWY., SUITE 200 • BEAVERTON, OR 97006 • (800) 445-4208, (503) 690-8090

• **XTREE FOR WINDOWS** is, for millions of DOS users, synonymous with file management, and the recent version is an impressive product. But DOS XTree users will need to acclimate themselves to the Windows version, since its keystrokes and feel are quite different.

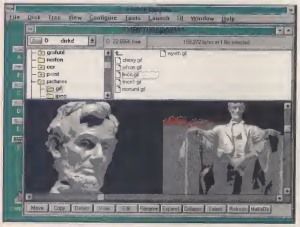
XTree for Windows stands out among its competitors in its ability to display custom directory trees—for example, it'll show just a branch of a single tree or all the trees from multiple drives as well as particular sets of files, such as files from several directories. XTree is a standalone program that appears as a single icon in a Program Manager group, so it doesn't take over your desktop like Norton Desktop and PC Tools do. Though it doesn't have drive icons, you can run multiple trees for each of your drives in minimized windows at startup, or you can show multiple drives in one minimized tree window.

XTree's equivalent to SuperFind and Smart Find can't compete; you can search for files across multiple drives by their name (with wildcards), but not by their file contents. The text viewer lets you search for a text string in the file being viewed, but it won't search a given directory for all files containing that text string.

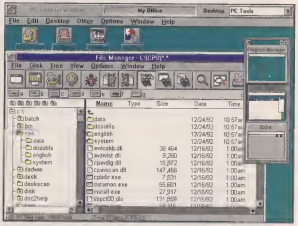
XTREE FOR WINDOWS 1.0, $99 • XTREE • 4115 BROAD ST., BLDG. 1 • SAN LUIS OBISPO, CA 93401-7993 • (800) 395-8733, (805) 541-0604

A BETTER FILE MANAGER

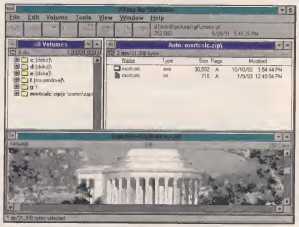
All three products are excellent. The file-management capabilities of **Norton** and **PC Tools** are similar, so your choice will be based on which desktop you prefer. If you're happy with the desktops, you'll like their file organizers. If you prefer Program Manager's or another standalone launcher's desktop but want more than File Manager has to offer, then **XTree** is your best bet.



NORTON DESKTOP's file-management capabilities include disk icons and an optional view panel that supports many graphics viewers.



PC TOOLS' file-management feature is incorporated into the desktop itself (like Norton Desktop's), but you can move it out of the way by placing drive icons in a window.



XTREE FOR WINDOWS doesn't take over your desktop with file-management features (unlike PC Tools or Norton). It stands out in its ability to display custom directory trees.

Viewing and Zipping Files

THE WINDOWS WAY

When it comes to viewing and compressing/decompressing files, there *is* no "Windows way." You must rely on third-party products.

THE BETTER WAY

Norton Desktop's wide array of viewers are among the speediest available under Windows. While the utility can view directories of zipped ZIP files, it can't view each of the files inside the ZIP directory, and it can't compress or decompress them. If you want to view and compress/decompress files, you'll need one of five products—any of the four below or Panoramic from Cimmetry Systems (800-361-1904), which should be shipping by the time you read this but wasn't available when we went to press. Several shareware utilities act as shells to PKzip—notably Winzip and Arcmaster for Windows, although those two limit viewing to text files only.

- **XTREE FOR WINDOWS** treats ZIP files as if they were separate disks. You have to invoke a menu choice to mount them, that is, to display them as disks on the tree menu. XTree supports directories inside ZIP files, so the files as well as the directories within them appear in the root directory of the ZIP disk. Mounting does not unzip the files. To do that, you

need to copy the files from a mounted ZIP file to a non-ZIP disk; the unzip occurs in the background.

XTree lets you view files from more than 30 word processors, spreadsheets, and databases, and it supports 13 graphics formats—excluding 24-bit color files. You can also save file views as windows or icons inside the XTree window for reference later in the same session. So when you choose a piece of clip art, for example, you might want to find an image that looks right, save the view of it as an icon, continue looking for other files, and then review several before making your final choice.

XTREE FOR WINDOWS 1.0, $99 • XTREE • 4115 BROAD ST., BLDG. 1 • SAN LUIS OBISPO, CA 93401-7993 • (800) 395-8733, (805) 541-0604

- **PC TOOLS FOR WINDOWS** treats files like subdirectories (rather than like disks as XTree does), a metaphor that seems more natural, since ZIP files seem more like a special subdirectory than like an entire disk. Unlike XTree, PC Tools doesn't require mounting to add the ZIP file to the directory window. The ZIP subdirectories simply appear on the tree in a different color from the other subdirectories. To unzip files, you copy the ZIP file to a normal directory.

PC Tools includes lots of viewers, but they're marred by the awkward way they handle multiple files. For instance, you can view several files together only if they're in the same directory; otherwise, viewing a second file closes other previous views you have open.

PC TOOLS FOR WINDOWS 1.0, $179.95 • CENTRAL POINT SOFTWARE • 15220 N.W. GREENBRIER PKWY., SUITE 200 • BEAVERTON, OR 97006 • (800) 445-4208, (503) 690-8090

- **OUTSIDE IN FOR WINDOWS** has a handy but limited set of general file-manipulation features and the best set of file viewers available. You can mark parts of text, spreadsheet, or data files and copy them to the Clipboard, which helps transfer information between files without the hassle of unzipping or loading files into Notepad. You can configure Outside In to appear as a menu item in File Manager, run it as a standalone program, or run it from major word processing and e-mail programs.

Rather than treat ZIP files as disks or as subdirectories, Outside In shows them as files. So when you view a ZIP file, you see the directory of files in the ZIP file. Double-click on one of the filenames in the ZIP directory, and Outside In unzips the file to a temporary directory and opens a new window that displays a view of that file.

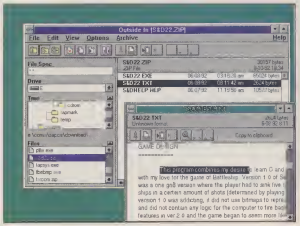
OUTSIDE IN FOR WINDOWS 2.0, $89 • SYSTEM COMPATIBILITY CORP. • 401 N. WABASH, SUITE 600 • CHICAGO, IL 60611 • (800) 333-1395, (312) 329-0700

- **DRAG AND VIEW and DRAG AND ZIP,** a shareware duo from Canyon Software, are ideal for users who like dragging and dropping. You set them up as icons on your desktop and drag your files onto them from File Manager for viewing or zipping. Drag and View includes viewers for word processing, database, spreadsheet, and bit-mapped files but not for vector-graphics files.

DRAG AND VIEW, $20 PLUS $5 SHIPPING AND HANDLING (SHAREWARE); DRAG AND ZIP, $20 PLUS $5 SHIPPING AND HANDLING (SHAREWARE); BOTH FOR $35 • CANYON SOFTWARE • 1537 4TH ST., SUITE 131 • SAN RAFAEL, CA 94901 • (415) 453-9779 • ON PC/CONTACT: DRAGZP.ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

A BETTER WAY TO VIEW AND ZIP FILES

Outside In's ability to let you cut and paste from the viewers makes it an especially handy utility. Outside In, together with File Manager, provides all the file-management capabilities that many people need.



OUTSIDE IN FOR WINDOWS, which has the best set of file viewers available, lets you view files inside ZIP directories; double-click on one of the filenames, and Outside In unzips the file and opens a new window displaying a view of that file. You can also highlight text and paste it to the Clipboard.

Managing Hard Disks

THE WINDOWS WAY

You need a variety of software tools to manage your hard disk, including backup, antivirus, unerase, disk diagnosis/repair, and defragmenting tools, as well as a disk cache. Windows 3.1's SmartDrive disk cache—though finally competitive with the best third-party products—is the only disk-management tool that Windows provides.

THE BETTER WAY

All three major utilities (PC Tools, Norton Desktop, and Fifth Generation's Direct Access Desktop) provide Windows-based antivirus and backup features. Indeed, this is what sets them apart from collections like Becker Tools and AttiTools. WinMaster from PC-Kwik—the company that dominated the third-party DOS cache market with Super PC-Kwik—also provides some interesting disk utilities.

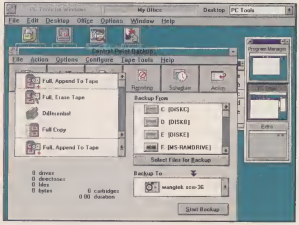
- **FIFTH GENERATION'S DIRECT ACCESS DESKTOP** includes Fastback Express for Windows backup software and a slick antivirus module that even looks inside your ZIP and LHA-compressed files. Though the entry-level version of FastBack that's included is not nearly as powerful as the backup program in Norton and PC Tools, it's easy to use and works for simple backup needs. This and the antivirus module are the best components of Direct Access Desktop, which also includes lukewarm File Manager and Program Manager replacements. The product's handy multiple-desktop manager is similar to but less powerful than the one included in PC Tools. Disk-diagnosis and repair, disk-caching, and defragging features are missing.
  DIRECT ACCESS DESKTOP 1.0, $129 • FIFTH GENERATION SYSTEMS • 10049 N. REIGER RD. • BATON ROUGE, LA 70809 • (800) 873-4384, (504) 291-7221

- **PC TOOLS FOR WINDOWS** offers especially strong disk-management features. The backup module supports SCSI tape drives and QIC-40 tapes. The defragmentation utility produces a clear report and reportedly runs in the background (although this feature didn't work in the prerelease version we reviewed). Also included are a disk-diagnosis-and-repair utility, an emergency disk maker, a cache, an antivirus program, delete protection, undelete utilities, and a DOS utilities disk for those occasions when you can't even run Windows.
  PC TOOLS FOR WINDOWS 1.0, $179.95 • CENTRAL POINT SOFTWARE • 15220 N.W. GREENBRIER PKWY., SUITE 200 • BEAVERTON, OR 97006 • (800) 445-4208, (503) 690-8090

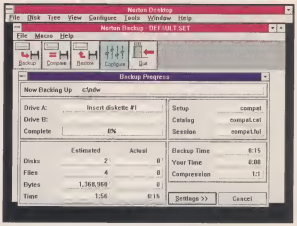
- **NORTON DESKTOP**'s disk utilities have a good reputation that gives some users a sense of security, even though they aren't quite as extensive as those in PC Tools. Its defragmentation program runs only outside of Windows, which may actually be a virtue, because defragmentation is tricky enough that you may want to do it in a cleaner environment than Windows.

A BETTER HARD DISK MANAGER

Direct Access Desktop places a distant third after **PC Tools** and **Norton Desktop**. It offers fewer modules with fewer features. On a formal ranking of diskutility features, PC Tools comes out slightly ahead. If you have a SCSI tape drive, for instance, go with PC Tools. Otherwise, it's a toss-up between PC Tools and Norton Desktop, which include similar sets of modules with comparable features.

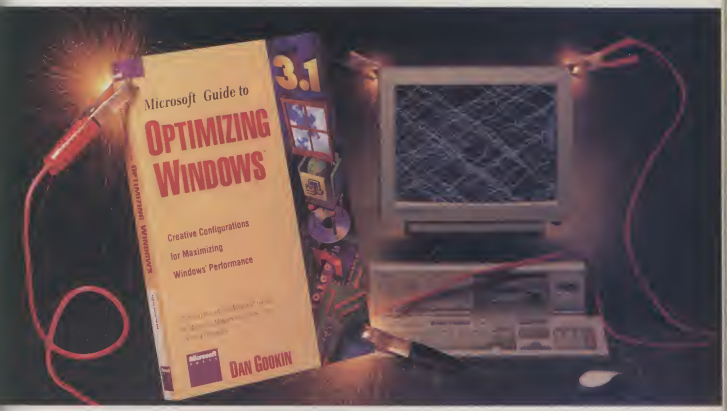


PC TOOLS comes with a full-featured backup program and offers support for SCSI drives.



NORTON DESKTOP's backup utility is similar to PC Tools' but supports QIC-40 instead of SCSI drives.

Windows™ 3.1 Energizer



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Norton Desktop's backup package supports QIC-40 tapes but not SCSI drives and includes a cache, an antivirus module, an emergency disk, and unerase, diagnosis, and delete-protection utilities.
NORTON DESKTOP FOR WINDOWS 2.0, $179 • SYMANTEC CORP. • 10201 TORRE AVE. • CUPERTINO, CA 95014-2132 • (800) 441-7234, (408) 252-3570

- **WINMASTER** is a more specialized collection of utilities. Some Winmaster packages (but not all—be careful when you buy one) include the Super PC-Kwik disk cache, which is one of the best. All versions include a defragger, a file allocation table (FAT) reporting utility, and a simple but elegant button-bar launcher. The PowerScope FAT reporter provides more information on your disk layout than any other program we've seen for Windows or DOS—and it has an accessible, easy-to-use interface. WinMaster lacks many disk-specific utilities such as antivirus, backup, diagnosis, and delete/undelete utilities, but its unique FAT reporter stands out.
WINMASTER 1.0, $129 • PC-KWIK CORP. • 15100 S.W. KOLL PKWY. • BEAVERTON, OR 97006-6026 • (800) 284-5945, (503) 520-4299

Launching Programs

THE WINDOWS WAY

If the 40-plus available program launchers are any indication, Windows Program Manager must be pretty awful. But, in fact, it does have some virtues: Copying programs to or from groups requires only a simple drag-and-drop movement; you can choose any icon you want for DOS sessions; and its hotkeys, which work even from DOS sessions, are a wonderful—and underused—feature. On the other hand, Program Manager won't let you nest subgroups, launch multiple apps with a single click, or keep a history list of the File, Run command.

THE BETTER WAY

New launchers are released more than once a month, and no other type of utility affects your interaction with Windows or reflects your personal taste as much as the launcher. You can either supplement Program Manager with a launching utility or replace Program Launcher altogether with one of two broad categories of launcher: the powerful omnipresent desktop shells (including object-oriented programs) that change all your interactions with Windows, or the minimalist shell that stays out of your way and changes only the way you access programs.

FEATURES THAT WINDOWS FORGOT

Collecting utilities that improve upon existing Windows features will certainly create a better Windows. But you'd be missing out if you didn't consider utilities that provide functions that Windows plain forgot.

System Analysis

Reporting and diagnostic utilities became popular in the DOS world and they are even more important for Windows. The following programs report an system details at a variety of levels: Windows, DOS, BIOS, and even hardware at a lower level. They can help track down and resolve hardware and software conflicts.

Both Norton Desktop and PC Tools include excellent reporting modules. In addition, three of the DOS standards have Windows counterparts: **QAPlus/Win** ($160; 800-342-4763, 408-438-8247), **WinSleuth Gold** from Dariana ($169; 800-892-9950, 714-236-1392), and our favorite, **Skylight** from the RenaSance Group ($99.95; 619-287-3348).

Keyboard Utilities

DEC's **Compose** (available on PC/Contact as COMPOS.ZIP in data library 3 (Utilities/Misc.)) is a free program that gives you an easy way to enter special characters like publishers' quotation marks (normally you need to press Alt and enter 0 1 4 7 on the keypad to enter an open double quote) or to enter the current date or your name. You assign an initial hotkey, by default the right Ctrl key, and then one or more keys to use with it.

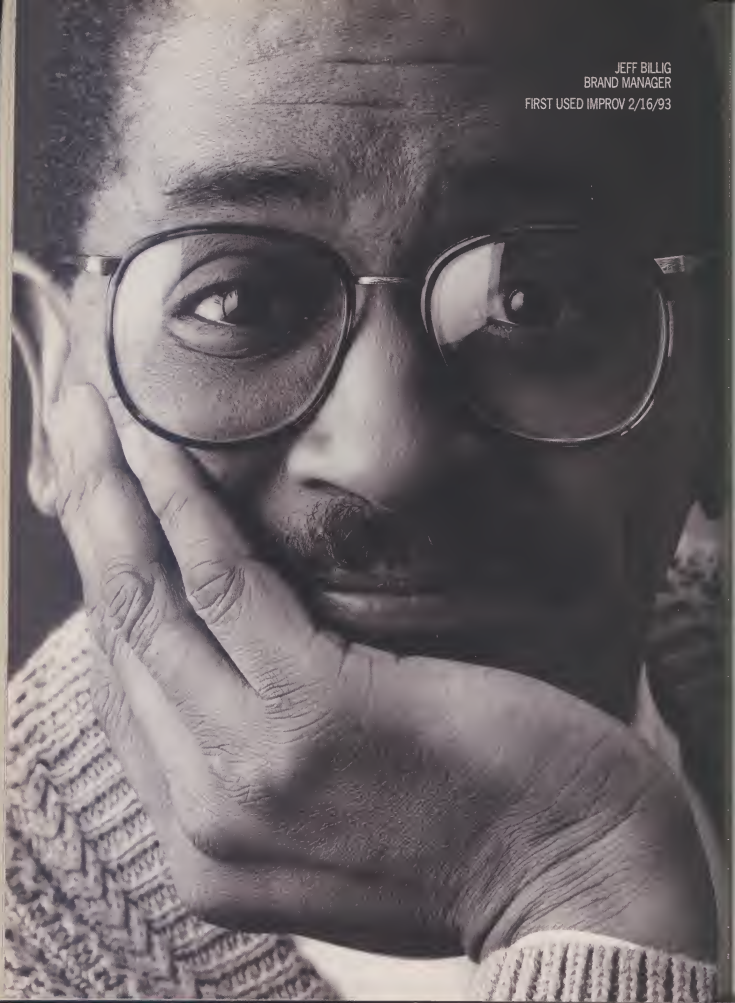
DataGem's **Winkey** ($15 shareware; on PC/Contact as WINKEY.ZIP in data library 3 (Utilities/Misc.)) lets you use the Shift key to release the Caps Lock keys, swap the Ctrl and Caps Lock key, and adjust the Shift keys.

Restart Utilities

Windows obviously lets you exit, but there's no way to restart Windows with a single click. **Rogers Rapid Restart** from Plannet Crafters ($10 shareware; on PC/Contact as RRR.ZIP in data library 3 (Utilities/Misc.)) lets you exit or restart Windows with no questions asked—it'll even let you close Windows while DOS sessions are open, which is invaluable but requires care.

Uninstallers

Uninstalling a Windows app can be a nightmare. Merely erasing the program directory doesn't suffice. There may be dynamic link libraries in your Windows System subdirectory, in an INI file, or in a section that's been added to WIN.INI. **UnInstaller** from Microhelp ($79; 404-516-0898) automatically handles uninstalling and more. It analyzes program files in the directory that needs uninstalling, determines what DLLs (other than Windows-standard DLLs) to call, and offers to delete them, but not without warning you that other programs could be using them. UnInstaller isn't perfect but it's the best solution to a messy problem.



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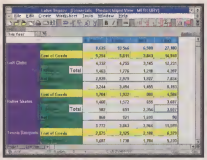

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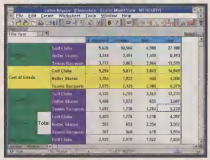

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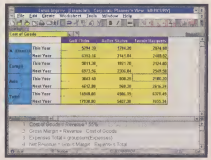

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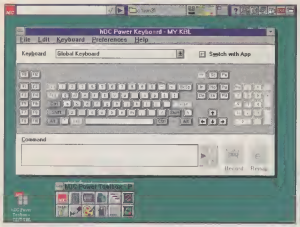
- **POWER LAUNCHER** falls in the former category, along with PC Tools, Norton Desktop, and Direct Access Desktop. Power Launcher's script language focuses on program launching, allowing you to launch programs via hotkeys, a button bar, a menu that attaches to each application's Control menu, or a command line at the top of the screen. Both Squeegee and Metz Task Manager provide minimalist launchers, as does WinMaster.
  POWER LAUNCHER 2.0, $99.95 • HDC COMPUTER CORP • 6742 185TH AVE NE • REDMOND, WA 98052 • (800) 321-4606, (206) 885-5550

- **PLUG-INS FOR PROGRAM MANAGER** is your best bet as a supplement to Program Manager. This shareware gem from Plannet Crafters lets you assign icons to groups, create custom cursors, and access free memory and resources from the right side of the menu bar. It also adds a history list to the Run dialog box (so you can run a program a second time in one session), a drop-down menu that lets you launch applications without having to search through program groups, and a menu item that saves the current setup. You can even assign an icon and hotkey to Program Manager itself. Its Install Application menu item searches for setup or install programs and lets you browse the READ.ME files before installation. Plug-Ins does not, however, let you nest subgroups or launch multiple applications with a single click.
  PLUG-INS FOR PROGRAM MANAGER, $20 (AVAILABLE AS SHAREWARE OR DIRECT FROM COMPANY) • PLANNET CRAFTERS • 2580 RUNIC WAY • ALPHARETTA, GA 30202 • (404) 740-9821 • ON PC/CONTACT PLUGIN ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

- **HOTWIN,** which has many of the features of Power Launcher, including hotkeys and multiple desktops, is an excellent choice if you want to replace Program Manager. The utility has other extras, including a pop-up menu you get by right-clicking on the desktop and a feature for automatically maximizing a specified program whenever you close or minimize the last full-size window. In power and scope, it's an intense product, but because it stays out of your way, it seems more like a minimalist shell.

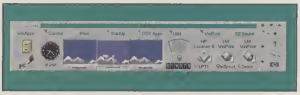
A BETTER PROGRAM LAUNCHER

This is such a personal decision that you should take your own test drives. We've selected Program Manager as our official shell because of its DOS hotkeys and because install programs often look for it. We supplement it with **Plug-Ins** and run hDC **Power Launcher** as our primary launcher for Windows applications. Among minimalist launchers, our pick is **Dashboard**.



POWER LAUNCHER lets you assign launch commands and switches to keystrokes and to toolbox buttons.

PLUG-INS FOR PROGMAN's screen looks like Program Manager, but look again—notice that groups have their own icons, that the right side of the menu bar lists free memory and resources, and that there's a QuickRun menu item.



DASHBOARD's compact window includes quick-launch buttons, a clock, a multiple-desktop switcher, a resource gauge, a print-driver swap, and quick access to your program groups.

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- **WINTOOLS** from Tool Technology is just one example of the industry trend toward object-oriented desktops. But if you look at WinTools and its brethren—Hewlett Packard's NewWave and Digital Equipment Corporation's Vivace—you may wonder how wise that direction is. Object orientation is definitely an acquired taste—it requires a different way of thinking from the DOS and Windows mindset—but if you like it, WinTools is your best bet. With an object-oriented desktop, you have to think about acting on objects; so for help on how WinTools' Copy Object works, for example, you don't press F1 but rather drag the Copy Object onto the Help Object. Nevertheless, WinTools' dynamic data exchange support, multiple desktops, well-designed file manager, and keyboard macros, make it a powerful shell.
  WINTOOLS 1.08, $149 • TOOL TECHNOLOGY PUBLISHING • 1125 "A" ST., SUITE 107 • SAN RAFAEL, CA 94901 • (800) 793-3701, (415) 459-3700

- **HP'S DASHBOARD** is the best of the minimalist shells. An enormous amount of functionality is available from a small window that represents a car's dashboard. You can access Program Manager groups, switch printers with the press of a button, show resources and free memory, display a clock with alarms, switch between several virtual screens, and launch your favorite utilities.
  DASHBOARD FOR WINDOWS 1.0, $99 • HEWLETT-PACKARD • 974 E. ARQUES AVE. • SUNNYVALE, CA 94086 • (800) 554-1305, (408) 720-3441

- **K-U-I** is a minimalist program launcher that takes greater advantage of the keyboard than of the mouse. The application is notable for its built-in DOS command line and the fact that it lets you launch programs via hotkeys.

  If you like the DOS-style menu programs, you should consider hDC Computer's **Windows Express,** which uses a tabbed file folder metaphor to orient you in a multilevel menu system. And since the menu items are linked to the same script language as Power Launcher, you have a lot of power at your fingertips.
  K-U-I 1.0, $79.95 • SOFTAC CORP. • 23 SUNSET RD • WINCHESTER, MA 01890 • (800) 433-0486, (617) 721-1010

  WINDOWS EXPRESS 4.0, $99.95 • HDC COMPUTER CORP. • 6742 185TH AVE. NE • REDMOND, WA 98052 • (800) 321-4606, (206) 885-5550

Switching Tasks

THE WINDOWS WAY

Switching easily and quickly between programs is so important that Windows provides several ways to access its Task Manager—choose the Switch to Menu item on your Windows application's Control menu, press a Task List hotkey (Ctrl-Esc), or double-click on the desktop to invoke the Task List. Task Manager itself is adequate but underpowered: You get a simple scrolling list with six buttons—Switch To, Close Application, Cancel, and three window-arrangement commands.

THE BETTER WAY

Windows gracefully accommodates third-party alternatives with the TASKMAN.EXE= line in the [boot] section of your SYSTEM.INI file. If you change the program name to the right of the equal sign, that program will run whenever you invoke Task Manager. Many virtual-desktop programs like Direct Access Desktop, HotWin, and PC Tools take advantage of this feature to give you customized task managers.

A BETTER TASK SWITCHER

Every Windows user will treasure the convenience of the **Metz Task Manager.** It offers a superset of the features included in Windows' Task Manager, making Metz Task Manager the ideal replacement.

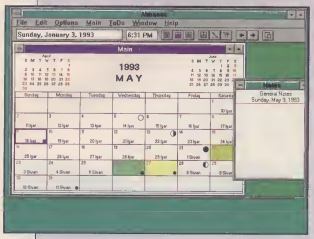
METZ TASK MANAGER's window includes (from the top): a menu; a drop-down list that displays either your task list or program groups; buttons to launch simple file-management applets; the task list itself; buttons to minimize, cascade, and arrange windows; nine quick-launch buttons; and a run box with date, time, memory, and resource information.

A BETTER CLOCK, CALENDAR, AND CALCULATOR

Besides the system-level utilities, Windows comes with a bunch of minioplications, often called *applets*. Some are small versions of full-blown applications (like Write or Pointbrush) and don't qualify as utilities, but Calculator, Calendar, and Clock do. A growing number of third-party utilities, such as the following ones, aim to replace these three utilities.

Hi Finance helps users with financial calculations like future value and loan amortizations. It's available from Brightridge Solutions ($59 shareware; 800-241-7203; available on PC/Contact as HIFINC.ZIP in data library 3 [Utilities/Misc.]). If you like HP calculators, check out **HP Calc** ($15 shareware; on PC/Contact as HPCALC.ZIP in data library 3 [Utilities/Misc.]).

For your calendar and clock needs, you'll want to check out **Almanac** from Impact Software ($49.95



ALMANAC can display the Jewish as well as the Gregorian calendar, phases of the moon, and your personal days. You can color-code events and add notes, appointments, and alarms.

shareware; 909-590-8522; available on PC/Contact as ALMNAC.ZIP in data library 3 [Utilities/Misc.]). You can configure it so that, when iconized, it shows the time. Double-click on it, and you get the most complete calendar you've ever seen. It can show holidays (including Jewish holidays), phases of the moon, sunset/sunrise times, or any days you specify. Although it's not a full-blown Windows information manager, you can also use it to track appointments and to set alarms.

Almanac prints a professional-looking monthly or yearly calendar. If you'd like a printed calendar with lots of little icons, look at **Calendar Maker** from CE Software ($70; 800-523-7638, 512-224-1995).

- **METZ TASK MANAGER FOR WINDOWS** replaces Windows' lowly Task Manager with a hot-rod cockpit. You can display the task list in text or icon form, and a few clicks allow you to replace the task list with the contents of any Program Manager group, so Metz can be used as a launcher. Also on the Metz panel is a pad of quick-launch buttons, a drop-down list for running programs with a recall feature, the date, time, resources, and memory information, and buttons that invoke mini-file-management applets.
  METZ TASK MANAGER 2.0, $49.95 • METZ SOFTWARE • P.O. BOX 6699 • BELLEVUE, WA 98008 • (800) 447-1712, (206) 641-4525

- **SQUEEGEE** is a minimalist launcher, file organizer, and task list. It places a single button on each application's title bar; clicking on that button displays a menu with submenus for launch groups and a task list you can use for switching between applications. Squeegee offers fewer functions than the Metz Task Manager but has the advantage of quick accessibility in full-screen windows.
  SQUEEGEE 1.0, $79.95 • ICOM SIMULATIONS • 648 S. WHEELING RD. • WHEELING, IL 60090 • (800) 877-4266, (708) 520-4440

Editing ASCII Files

THE WINDOWS WAY

If you're used to DOS's Edlin, Notepad may seem like heaven, but it still leaves a lot to be desired. You can't edit more than one file at once, it doesn't include an undo command or any macros, and it doesn't allow you to perform sophisticated searches or to edit files over about 50K.

THE BETTER WAY

Simple editors abound on BBS's, but if you're looking for powerful search and undo capabilities, you have fewer options.

- **NORTON DESKTOP FOR WINDOWS** includes an excellent Desktop Editor that allows you to edit files of unlimited size and to edit multiple files concurrently. It features multiple levels of undo and tracks the last four files edited. Its search feature allows case-sensitive searches and includes a sophisticated set of wildcards and Boolean constructions. (Users familiar with Unix will recognize this sophisticated set of search criteria.) The Editor also compares two files, loads all files containing a given expression in one directory, and allows you to assign hotkeys to various Editor functions.
  NORTON DESKTOP FOR WINDOWS 2.0, $179 • SYMANTEC CORP. • 10201 TORRE AVE. • CUPERTINO, CA 95014-2132 • (800) 441-7234, (408) 252-3570

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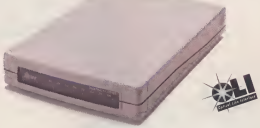

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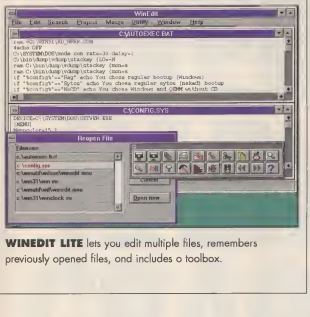
- **THE SHAREWARE PROGRAM WINEDIT LITE** is generally more powerful than Norton's editor, even though it is missing the file-comparison feature and the ability to load all files containing a given expression in one directory. It, too, supports Unix and case-sensitive searches and allows you to edit multiple files concurrently, perform multilevel undos, and edit files of unlimited size. But WinEdit Lite goes further: Its undo is paired with a redo function, it displays as many files as the scroll list will hold, and it has a button bar. Moreover, WinEdit Lite will print files in portrait mode and in "two up" mode, which is two pages per sheet in landscape orientation. WinEdit also comes in a Standard version, which has links to compilers; the Pro version has everything the Standard version does plus a full-fledged macro language.
WINEDIT 2.0 LITE, $29.95; STANDARD, $59.95; PROFESSIONAL, $89.95 (ALL SHAREWARE) • WILSON WINDOWWARE • 2701 CALIFORNIA AVE. SW, SUITE 212 • SEATTLE, WA 98116 • (800) 762-8383, (206) 938-1740 • ON PC/CONTACT: WINEDT.ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

A BETTER ASCII FILE EDITOR

At $30, how can you afford not to have **WinEdit Lite?** It provides multilevel undo and a powerful search capability, and you can edit multiple files at once.



WINEDIT LITE lets you edit multiple files, remembers previously opened files, and includes a toolbox.

Managing Multiple Programs

THE WINDOWS WAY

Windows is great at running lots of programs at once—and at cluttering your screen. Program Manager rides herd by letting you start only one program at a time.

THE BETTER WAY

There are two ways to launch multiple programs at once: The simple method employs a launcher that has a script language or some other facility for launching several programs with a single click—the way FirstApps does. More elaborate but more useful is a virtual-desktop program, such as Rooms for Windows or PC Tools for Windows, that lets you switch between and simultaneously launch preselected suites of applications.

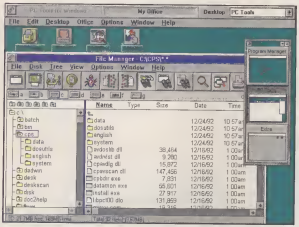
- **FIRSTAPPS,** a collection of 20 miniutilities, includes a powerful and flexible suite organizer that features the full hDC script language. The script language is easier to use in FirstApps than it is in Power Launcher. For instance, you can place suite names either on the Windows Control menu or in the suite organizer itself. To create an applications suite, simply launch all the apps you want in a suite, press a button in the suite-organizer window, and name the button. It's easy to set up initially and to customize later. Besides the suite organizer, FirstApps features an automated file-save feature and a program that attaches file operations (like copy) to any program's Control menu.
FIRSTAPPS, $99.95 • HDC COMPUTER CORP. • 6742 185TH AVE. NE • REDMOND, WA 98052 • (800) 321-4606, (206) 885-5550

- **ROOMS, PC TOOLS, and DIRECT ACCESS DESKTOP** are more powerful programs that divide your screen into different desktops, each with its own set of icons and application suites. The virtual-desktop program displays only one desktop window at a time but lets you easily switch between active desktops. These three programs perform this switch by hiding and revealing desktops using the hidden attribute (see "Secrets for Copying with Icon Clutter," page 139). While you can select each virtual desktop's wallpaper and color scheme, you're limited to using only Alt-Tab for switching between programs in the active desktop.
DIRECT ACCESS DESKTOP FOR WINDOWS 1.0, $129 • FIFTH GENERATION SOFTWARE • 10049 N. REIGER RD. • BATON ROUGE, LA 70809 • (800) 873-4384, (504) 291-7221

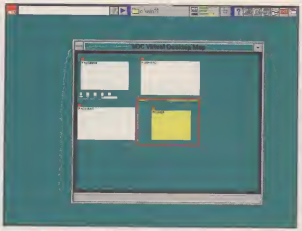
PC TOOLS FOR WINDOWS 1.0, $179.95 • CENTRAL POINT SOFTWARE • 15220 N.W. GREENBRIER PKWY., SUITE 200 • BEAVERTON, OR 97006 • (800) 445-4208, (503) 690-8090

A BETTER PROGRAM MANAGER

You'll find virtual desktops useful no matter what program provides the service, but two programs stand out: **PC Tools** offers the clean hidden-programs approach that includes hotkey support for switching between desktops, while **Power Launcher** provides ample ways to switch between virtual desktops; its program-switching script commands can be entered at the command line or linked to hotkeys or buttons.



PC TOOLS displays one desktop window at a time but the drop-down list and the three-windowed box in the upper right corner indicate which desktops are active.



POWER LAUNCHER's virtual desktop features hotkeys for switching between desktops.

ROOMS FOR WINDOWS, $99 • XSOFT • XEROX CORP • 3400 HILLVIEW AVE • P.O. BOX 10034 • PALO ALTO, CA 94303 • (800) 626-6775

- **TOPDESK, BIGDESK, WIDEANGLE, AND POWER LAUNCHER** are virtual desktops that switch between desktop screens by setting up Windows to run on a display with dimensions larger than those of your monitor. For example, with nine virtual desks arrayed three by three on a 640-by-480-pixel monitor, the virtual desktop causes Windows to display its programs as though it were running on a 1,920-by-1,440-pixel monitor. The result is that programs can run in a location off the visible screen. Switching between desktops means deciding which part of the larger virtual screen to display on the actual monitor.

  Some virtual desktops, such as PC Tools and Power Launcher, feature hotkeys for switching between desktops. The ability to launch programs and simultaneously specify which desktop they appear in is a feature offered by all the programs except BigDesk. And all have pop-up maps that let you drag programs from one desktop to another. A feature that distinguishes the Rooms and WideAngle virtual-desktop programs is their ability to specify a full-screen DOS session as a desktop.

  In addition, several programs described under Launching Programs have virtual-desktop capabilities that surpass those of TopDesk and BigDesk, even though they're not full-fledged virtual-desktop programs. They are Dashboard, a minimalist program launcher; HotWin, which features hotkeys but is less powerful than Power Launcher; and WinTools, which takes an object-oriented approach.

AMISH DESK (PART OF AMISH UTILITIES 1.0), $99 • AMISH SOFTWARE • 1082 WASHINGTON ST. • MOUNTAIN VIEW, CA 94043 • (415) 988-7159

BIGDESK (PART OF BACKDESK 2.4), £20 (APPROX. $32) • SP SERVICES • P.O. BOX 456 • SOUTH HAMPTON, UK SO77X9 • 44-703-550037 • PC/CONTACT, BIGDSK.ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

POWER LAUNCHER 2.0, $99.95 • HDC COMPUTER CORP. • 6742 185TH AVE. NE • REDMOND, WA 98052 • (800) 321-4606, (206) 885-5550

TOPDESK (INCLUDED IN THE WINDOWS RESOURCE KIT), $19.95 • MICROSOFT • ONE MICROSOFT WAY • REDMOND, WA 98052 • (800) 426-9400

WIDEANGLE 3.0, $80 • ATTITASH SOFTWARE • 20 TRAFALGAR SQ. • NASHUA, NH 03063 • (800) 736-4198, (603) 882-4809

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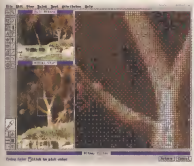

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Using the Command Line

THE WINDOWS WAY

Some folks may bash the C: prompt, but for quickly copying a single file, nothing beats the command line. Windows has the good old DOS prompt, but you can't launch Windows applications from it.

THE BETTER WAY

Several programs give you a window that supports all of DOS's internal commands and includes the ability to launch Windows apps.

- **WINCLI** (Windows Command Line Interface) comes in two varieties: as shareware and in a retail Pro version. Both support DIR, COPY, and most other DOS commands and keep a history of commands you've issued (up to 3 in the shareware version; up to 1,000 in the Pro). It also lets you launch Windows apps and scroll back to text that is off the screen. The Pro version supports the FINDFILE and RENDIR commands as well as the full Clipboard, and it can place the directories' path in the DOS window title.
  WINCLI SHAREWARE, $35, WINCLI PRO, $79.95 • ESCHALON DEVELOPMENT • 110-2 RENAISSANCE SQUARE • NEW WESTMINSTER, BRITISH COLUMBIA, CANADA V3M 6K3 • (604) 520-1543 • ON PC/CONTACT: WINCLI ZIP IN DATA LIBRARY 3 [UTILITIES/MISC.]

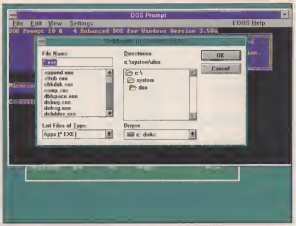
- **IMPOSTER**, a freeware application, supports multiple commands per line, keeps a 16-line command history, and launches Windows apps. It also runs batch files in its window rather than launching COMMAND.COM, supports I/O redirection, and has a rich set of filters.

  Unfortunately, these command-line programs scroll the screen slowly. Issuing a DIR command on a directory with 457 files took 1 minute and 45 seconds with WinCLI, 1 minute and 20 seconds with Imposter, and only 19 seconds in a DOS window!
  IMPOSTER 1.01, FREE • DARRELL BURGAN • 6400 INDEPENDENCE PKWY., SUITE 4103 • PLANO, TX 75023 • BBS SUPPORT: (214) 517-8443 • ON PC/CONTACT: IMPSTR.ZIP IN DATA LIBRARY 3 [UTILITIES/MISC.]

- **EDOS** lets you launch Windows apps from DOS windows and use a batch file to turn background processes in DOS sessions on and off. It also provides a menu bar for your windowed DOS sessions. You can even drag a filename from File Manager and drop it into the DOS session's keyboard! EDOS works like magic in 386 mode with a virtual device driver, or VxD. A virtual device driver is a program that runs in protected mode and provides services to DOS sessions with no conventional memory overhead.
  EDOS, $39.95 • FIREFLY SOFTWARE SYSTEMS CORP. • P.O. BOX 5035 • OREGON CITY, OR 97045-8035 • (800) 248-0809, (503) 694-2282

A BETTER DOS COMMAND LINE

By improving upon DOS, **EDOS** offers some big advantages—DOS programs run in its window, so its magic works at more than just the command line. It also supports ANSI.SYS (if you like fancy prompts) and gives quick access to session parameters. But it requires a 386, and DOS sessions take more memory than they do in command-line programs. So if you're running in Standard mode or on a low-memory setup, you may want WinCLI or Imposter. Both are excellent, but **Imposter** gets the nod for its batch-file support and a price that can't be beat.



EDOS adds a menu bar to windowed DOS sessions and includes a command to pop up a file picker whose choice is sent to the DOS session's keyboard.

IMPOSTER's screen looks and acts like a DOS window, but it isn't. Imposter runs in Standard mode and uses much less memory than DOS does.

Clipboard Enhancers and Scrapbooks

THE WINDOWS WAY

Windows provides a simple but useful data-transfer area called the Clipboard. You can load files into the Clipboard, view what's in it, and save the contents in a special proprietary format. But you can't load a file from disk to the Clipboard even if it's in a standard format (like TXT, BMP or WMF). You also can't easily append text to the Clipboard or save the contents of the Clipboard for future use in the same session. Moreover, Windows provides no tools for saving and organizing clip art.

THE BETTER WAY

Scrapbook Plus and ClipMate automatically store Clipboard contents for future use, and Scrapbook Plus and ImagePals help you organize your clip art.

- **SCRAPBOOK PLUS** displays files in a variety of bitmap, vector, text, and data formats as thumbnails, which it collects in scrapbooks. It automatically pastes files from the Clipboard to the active scrapbook file and imports a variety of file types from disk. You can assign descriptive text to the thumbnails and later search for that text.

  Scrapbook is a Windows 2.*x* application that has barely been upgraded for Windows 3.1, and it shows—bitmaps are black and white, and it's difficult to transfer clips between scrapbooks. But for organizing graphics in the Clipboard, Scrapbook's the only game in town.

  SCRAPBOOK PLUS 2.2, $129 • CENTRAL POINT SOFTWARE • 15220 N.W. GREENBRIER PKWY., SUITE 200 • BEAVERTON, OR 97006 • (800) 445-4208, (503) 690-8090

- **CLIPMATE** handles text in the Clipboard with aplomb. It saves each text fragment as you place new ones in the Clipboard, so you can recall them later and place them back in the Clipboard. You can also piece together a "large clip" by appending an unlimited number of clips to the Clipboard. And descriptions of these clips can be assigned and edited. ClipMate's major limitation is its lack of support for any graphics format—a shortcoming that should be addressed in the next version, due out this spring.

  CLIPMATE 1.5, $25 (SHAREWARE) • THORTON SOFTWARE SOLUTIONS • PO. BOX 26263 • ROCHESTER, NY 14626 • ON PC/CONTACT: CLIPMAT.ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

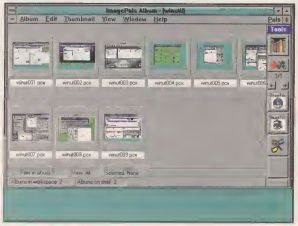
- **IMAGEPALS** is a set of three applications: A solid business-oriented image editor (albeit not as good as Photo Finish or Photo Magic, the best nonprofessional image editors), a screen-capture program, and an album program that organizes your clip art. ImagePals makes superb use of drag-and-drop techniques, both to move clips between albums and also to move clips to applications that support drag-and-drop from File Manager.

  Alas, its support for text is limited—for instance, it doesn't let you view text files without launching the associated application—and its links to the Clipboard are weak.

  IMAGEPALS 1.2, $249 • U-LEAD SYSTEMS • 970 W. 190TH ST., SUITE 520 • TORRANCE, CA 90502 • (800) 858-5323, (310) 523-9393

A BETTER CLIPBOARD ENHANCER

For organizing a lot of clip art, **ImagePals** is a wonderful product, although it's pricey if you don't need the image editor. For an enhanced Clipboard, a super program would combine features from each of the products, but none is compelling enough on its own—unless your needs are limited. If you want Clipboard support for just text, go with ClipMate; for just graphics, check out ScrapBook Plus.



IMAGEPALS includes an album program that organizes your clip art, an image editor, and a screen-capture program.

Managing INI Files

THE WINDOWS WAY

As the Apple ads are fond of pointing out, you'll occasionally need to tinker with your four basic system configuration files: CONFIG.SYS, AUTOEXEC.BAT, WIN.INI, and SYSTEM.INI. Windows ships with an applet called SysEdit that automatically displays each of these files in an editing window. But SysEdit is limited: It resides in your Windows System subdirectory, it's not documented in the Windows manual, it doesn't track changes to your INI files, and it doesn't offer any way of automatically restarting Windows after you've edited an INI file.

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LOGITECH

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Circle 177 on reader service card.

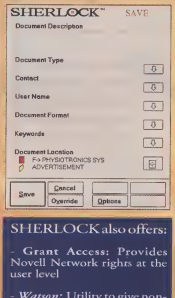
*Price comparisons based on SRPs at press date. 8x10 photo was scanned at mfr's recommended settings, without retouching. TM/®–trademarks belong to their registered owners. GSA approved.

Why Are You Still Working With DOS File Names?

Creating documents using Windows' applications has been getting easier, but figurin out how to describe that file with only 8 characters is still as difficult as ever...until no Physiotronics' SHERLOCK allows users to fully describe their files with up to 254 characters, and also offers a powerful file management system with its user-friendly *Visual Filing Environment*

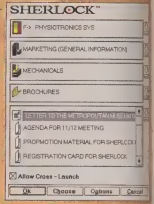
SHERLOCK is an extension to the Windows file management environment--it replaces the 'Save' and 'Open' dialog boxes--and is automatically available when using the Windows' standard pull-down menus, providing seamless integration with every compatible application. You can take advantage of SHERLOCK's file management powers as soon as it is installed.

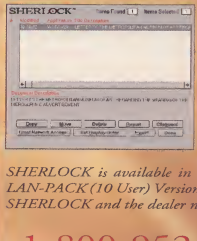
SHERLOCK's Save Card:
With SHERLOCK, every compatible application has the same 'Save Card' whenever you use the application's 'Save' command. SHERLOCK pops-up instead of the original 'Save' dialog box. SHERLOCK allows you to name a file with up to 254 characters--no more file names like: Bobjune.doc or Phyany93.xls. *Files saved with SHERLOCK make DOS file names a thing of the past.*



SHERLOCK's Visual Filing Environment:
DOS directories are accessed through a visual filing environment of *Doors, Cabinets, Drawers and Folders,* all of which can be named with up to 40 characters. This interface makes filing and retrieving your files familiar and easy.

SHERLOCK also provides the basic file management functions such as: *Add, Move, Delete, Export, Rename, Copy, etc.*





SHERLOCK's List Car
Files are instantly retrieved using a 'Best-Fit' lookup whenever you use the application's 'Open' command. SHERLOCK 'List Card' displays all the that match the 'Best-Fit' characteristics in a matter seconds. Double-click on desired file and SHERLOC automatically launches the

SHERLOCK is available in Single User Version a LAN-PACK (10 User) Version. To find out more ab SHERLOCK and the dealer nearest you, call:

1-800-952-2314

SHERLOCK also offers:

- **Grant Access:** Provides Novell Network rights at the user level
- ***Watson:*** Utility to give non-supported SHERLOCK applications access to SHERLOCK files.
- ***WhatIsWhereIs:*** Utility to locate SHERLOCK files under DOS.

SHERLOCK

THE ULTIMATE FILING & RETRIEVAL SYSTEM FOR WINDOWS

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Physiotronics Logo are trademark of Physiotronics Corporation, USA. Patent Pending. All product nam assumed to be the trademarks of their respective o

Circle 117 on reader service card.

THE BETTER WAY

Configuration file editors help you locate INI file sections, make it easy to edit values, and provide limited tools that tell you which INI file changes are available and which you may want to act on.

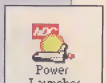
- **INIEDIT AND INICLEAN** give you access to any INI file on a section-by-section basis. They can locate unneeded INI files and sections in WIN.INI you want to remove. The programs list the bracketed sections; select a section, and available variables and values are displayed. You can edit the values without accidentally changing what appears on the left side of the equal sign. IniClean is included in the UnInstaller package discussed in "Features that Windows Forgot," page 119.
  INIEDIT, $25 (SHAREWARE) • CHARLES E. KINDEL, JR • 22925 N.E. 12TH PLACE • REDMOND, WA 98053 • ON PC/CONTACT: INIEDIT.ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

- **SYSTEM ENGINEER** uses a completely different approach. The program displays a menu of icons representing configuration areas like drives or 386-Memory. When you select an area, a dialog box pops up with a check box or number wheels for entering changes to the appropriate lines of the INI file. For example, with System Engineer, it's easy to figure out how to change the font used in icon labels—you simply choose the font from a dialog box to see the change without restarting Windows. Superb help, in-

SECRETS FOR COPING WITH ICON CLUTTER

Start running a lot of Windows utilities, and you'll probably wind up with their icons cluttering up your screen.

One way to cope with the clutter is to use the hidden attribute, a Windows feature that allows a program to run without it being shown onscreen. Same programs do this far you—far example, After Dark hides your entire desktop; you make it visible just by moving the mause.



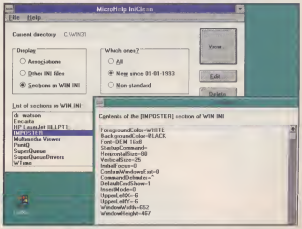
But to hide and reveal most utilities, you'll need third-porty taals. **Power Launcher** adds the Hide a Program aptian to each application's Cantral menu, and its script language hides or shaws any given pragram. Its task list alsa shaws hidden programs and lets yau switch to them. **WinBatch** also lets yau hide programs and make them visible. Finally, the task list from **Metz Task Manager** can display and let yau switch to hidden programs.

One caveat: Using these third-porty taals ta manage ican clutter may adversely affect the operatian af any of the three virtual-desktop programs (Roams, PC Taals, ar Direct Access Desktap) that hides ond unhides programs as a way of managing virtual desktaps.

A BETTER INI FILE MANAGER

System Engineer is warthwhile far the help file alane, thaugh it includes much more. **IniClean** has extra bells and whistles, and it supplements rather than duplicates System Engineer's functionality.

SYSTEM ENGINEER's graphical menu gives yau clear access to many Windaws parameters. Far example, yau can see the fant used far ican captians.



INICLEAN lets yau display INI files section by section. Once you select a section, available variables and values are displayed far editing.

cluding an online version of the troubleshooting section of the Windows Resource Kit, is just a button click away.

SYSTEM ENGINEER, $49.99 • WINDOWS USERS GROUP NETWORK (WUGNET) • 107 S. MONROE • MEDIA, PA 19063 • (215) 565-1861

Managing Fonts

THE WINDOWS WAY

With the release of Windows 3.1, Microsoft gave Windows a superb scalable-font engine. But aside from providing a simple installation applet and a character-map applet, Microsoft left users on their own.

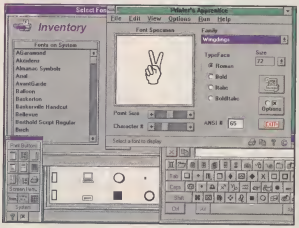
THE BETTER WAY

You'll need more font utilities if you have a TrueType font pack or lots of PostScript fonts. Several programs provide printed output samples, convert fonts from one format to another, allow you to edit fonts (to add a fraction or company logo, for instance), and manage a large number of fonts to keep font menus simple.

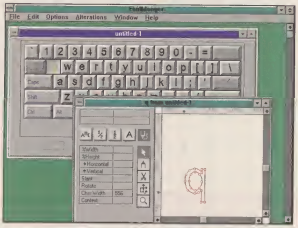
- **PRINTER'S APPRENTICE** generates font information including inventories (lists of font names with samples), spec sheets (samples in different point sizes), character charts, and visual keyboards. **Fonter** has similar capabilities, but its spec sheets don't have the elegance of Apprentice's. However, Fonter's character map is more useful for symbol fonts, since it lists ANSI codes and character equivalents.

A BETTER FONT MANAGER

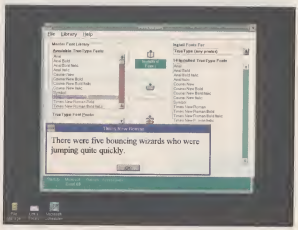
Virtually every user can benefit from **Printer's Apprentice**. For organizing fonts, get **FontMinder** (and one of the attractive collections from Microsoft, Bitstream, or Monotype if you need TrueType fonts). For manipulating the fonts themselves, you might want to consider **FontMonger,** unless you have high-end needs, in which case Fontographer is a superb product.



PRINTER'S APPRENTICE lets you view a font in many different ways—in keyboard format, in a character list, and in a font list. You can print elegant output samples in these various formats.



FONTMONGER, with all the font editing functionality most users need, lets you edit individual characters in a font, add fractions, and translate from one outline format to another.



FONTMINDER's master library maintains its own database of fonts on your system. Its display function lets you view the selected font.

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PC Week
January 4, 1993

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—*BYTE*, Essential Guide to Windows, 1992

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—Chris Aher, MCI International

"Quattro Pro for Windows is the easiest to use and has the best graphics and development tools. It's better integrated than either of the other programs."

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—Prudential Bache Securities, Inc.

"Quattro Pro provided the best transition from 1-2-3 [compared to Excel and 1-2-3 for Windows]."

—*PC World*, January 1993

"The interface in Quattro Pro for Windows [is] so much better than other vendors. . . . We reaped the benefits of a great idea already hammered into a highly usable form."

—Jim Seymour, *PC Week*, December 1992

". . . it's enough to make an experienced Excel user want to switch."

—Christopher Lindquist, *Computerworld*, October 1992

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In Canada, call 1-800-461-3327.

Borland® Quattro® Pro for Windows

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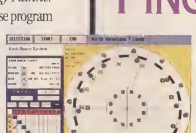

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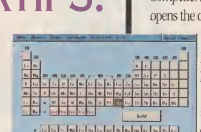

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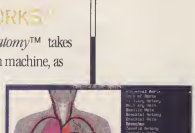

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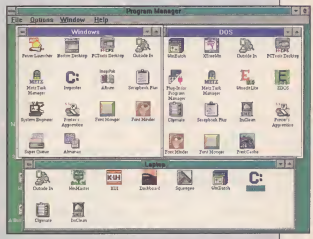
UTILITY COLLECTIONS FOR EVERY PC USER

Your choice of Windows utilities depends on your work style. Users who are comfortable at the command line will opt for different products from users who prefer dragging and dropping. To help you choose a set of utilities, we recommend three collections for three types of users. And since the number of utilities that users add to their work space also varies, the tasks are ordered according to their importance, with must-haves listed first. If you add nothing else to your desktop, at least choose a new file manager and program launcher.

DOS EXPERT Uses a mix of DOS and Windows applications; comfortable working at the command line; spent many years with DOS applications and likes their familiarity; owns a SCSI hard drive.

WINDOWS EXPERT Uses mostly Windows apps; prefers graphical icons and symbols to code; uses the mouse adeptly and prefers drag-and-drop movements; owns a QIC-40 tape drive.

LAPTOP USER Uses a mix of DOS and Windows apps; tries to use keyboard commands as much as possible; wants to use each utility for as many tasks as possible to save hard disk space; occasionally willing to stick with Windows apps to save space.



The DOS expert, Windows expert, and laptop user have varying needs that require different utility collections.

	TASK	DOS EXPERT	WINDOWS EXPERT	LAPTOP USER
MUST HAVES	**MANAGING FILES**	XTree	Norton Desktop or PC Tools	XTree
	LAUNCHING PROGRAMS	Plug-Ins for ProgMan	Power Launcher or Dashboard	Dashboard or K-U-I
HIGHLY RECOMMENDED	**MANAGING MULTIPLE PROGRAMS**	PC Tools	Power Launcher	Dashboard or nothing at all
	VIEWING/ZIPPING FILES	Outside In	PC Tools or XTree	Outside In
	TASK SWITCHING	Metz Task Manager	Metz Task Manager	Windows Task Manager
	MANAGING HARD DISKS	PC Tools	Norton Desktop	WinMaster
RECOMMENDED	**MANAGING FONTS**	Printer's Apprentice, FontMinder, and Font Monger	Printer's Apprentice, FontMinder, and either FontMonger or Fontographer	None
	MANAGING PRINTING	Print Cache	SuperQueue	Windows Print Manager
	EDITING ASCII FILES	WinEdit Lite	Norton Desktop	WinEdit Lite or Windows Notepad if space is tight
OPTIONAL	**AUTOMATING REPETITIVE TASKS**	WinBatch	Power Launcher	WinBatch
	MANAGING INI FILES	IniClean	System Engineer	IniClean
	ENHANCING THE CLIPBOARD AND SCRAPBOOKS	ClipMate and Scrapbook Plus	ImagePals and Scrapbook Plus	ClipMate
	USING THE COMMAND LINE	EDOS	Imposter	Imposter

PRINTER'S APPRENTICE 5.5, $20 (SHAREWARE) • LOSE YOUR MIND DEVELOPMENT • C/O BRYAN T. KINKEL • 506 WILDER SQUARE • NORRISTOWN, PA 19401-2643 • ON PC/CONTACT PRNAPP.ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

FONTER 5.0, $15 (SHAREWARE) • OSOSOFT • 1472 SIXTH ST. • LOS OSOS, CA 93402 • ON PC/CONTACT FONTER ZIP IN DATA LIBRARY 3 (UTILITIES/MISC.)

- **TYPECASE and FONTMINDER** organize your fonts into collections. FontMinder works with both PostScript and TrueType fonts, while Typecase works only with TrueType and manipulates only fonts placed in your Windows System subdirectory. But TypeCase comes with 130 TrueType outlines. Some of the decorative faces, like the Broadway equivalent, are quite good; some standard fonts, such as the equivalents of Garamond and Gil Sans, are uneven and dull.

TYPECASE, 49.95 • SWFTE INTERNATIONAL • 724 YORKLYN RD. • HOCKESSIN, DE 19707 • (800) 237-9383, (302) 234-1740

FONTMINDER, $79.95 • ARES SOFTWARE • 561 PILGRIM DR., SUITE D • FOSTER CITY, CA 94404 • (800) 783-2737, (415) 578-9090

- **FONTMONGER and FONTOGRAPHER** both let you edit fonts. FontMonger offers all the functionality most users need to convert and edit fonts. It supports automated fraction creation and batch conversion, including auto-hinting and editing individual Bézier nodes in the outlines. If you have sophisticated editing needs—if you create fonts or kern pairs—you'll want Fontographer, which has a font-header editor.

FONTOGRAPHER 3.5, $495 • ALTSYS CORP. • 269 W RENNER PKWY • RICHARDSON, TX 75080 • (800) 477-2131, (214) 680-2060

FONTMONGER • ARES SOFTWARE • P.O. BOX 4667 • FOSTER CITY, CA 94404 • (800) 783-2737, (415) 578-9090

Managing Printing

THE WINDOWS WAY

Print speed has long been one of Windows' weak spots. While Print Monoger improves in each version, its speed and interface ore still far from state of the art.

THE BETTER WAY

At least three Print Monoger replacements ore ovoilable: SuperQueue, PrintQ, and Print Cache. All provide enhonced printing speed.

- **SUPERQUEUE** has some advantages for Windows users—it's purely a Windows application, so it doesn't include a DOS TSR like the other two. Of course, you can't directly pop it up in a DOS session—you have to switch back to Windows to use it.

SUPERQUEUE, $39.95 • ZENOGRAPHICS • 4 EXECUTIVE CIRCLE, SUITE 200 • IRVINE, CA 92714 • (800) 366-7494, (714) 851-6352

- **PRINTQ** lets you restart a fouled print job from any page. However, we found its interface awkward and difficult to use.

PRINTQ, $149 • SOFTWARE DIRECTIONS • 1572 SUSSEX TURNPIKE • RANDOLPH, NJ 07869 • (800) 346-7638, (201) 584-8466

- **PRINT CACHE** not only prints the fastest, but it also reports printer errors. The version we tested changed its icon when we ran out of paper and when we encountered other printer errors. The version due out by the time you read this (Version 3.1) will allow WAV file audio feedback and/or a warning tone. And it will have special support for the HP LaserJet 4. PrintQ and Print Cache require about 10K to 25K of memory, depending on the configuration options.

PRINT CACHE, $149 • LASERTOOLS • 1250 45TH ST., SUITE 100 • EMERYVILLE, CA 94608 • (800) 767-8004, (510) 420-8777

A BETTER PRINT MANAGER

Go with **Print Cache** (which wins over SuperQueue by o hair) for its printer-feedback feature ond overoll speed.

PRINT CACHE reports an printer errors as they happen, letting you know, far instance, when you run out of paper.

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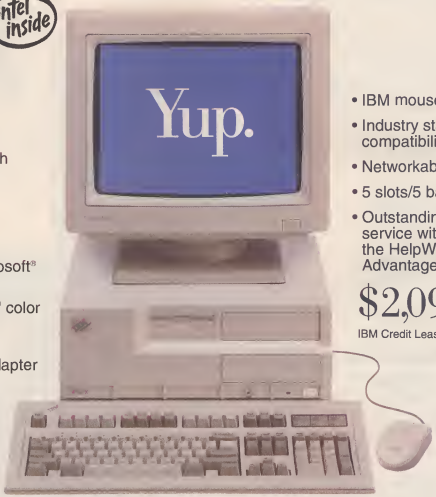

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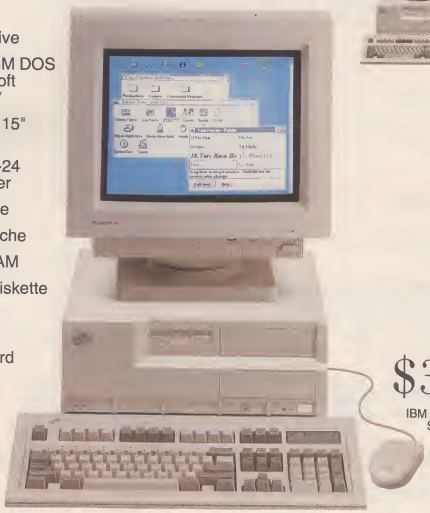

PS/ValuePoint
325T

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Hundreds of IBM products
The 40-page IBM Direct Catalog features other IBM PS/ValuePoint and ThinkPad configurations. The catalog highlights a broad range of other products such as application software, storage devices, memory options, connectivity adapters and much more. And if you want a PS/ValuePoint system with OS/2® 2.0, that too is available on many configurations.

The HelpWare Advantage

- **One-year on-site warranty for PS/ValuePoint products and ThinkPad 300.**
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- **24-hour 800# assistance, 7 days a week[1]**
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POWER-PACKED SPREADSHEET SECRETS

How to automate and accelerate your way to Windows spreadsheet mastery.

YOU SWITCHED TO A WINDOWS SPREADSHEET because it's powerful and easy to use. At least, that was the promise. But sometimes it seems the balance isn't quite right.

Sure, it's easier to get the basics done. Excel 4.0, Quattro Pro for Windows, and 1-2-3 for Windows all let you move and copy cells just by dragging them around your screen with the mouse. All three programs let you create a series of labels automatically—just type a simple entry like JANUARY and expand it into a year's worth of cell headings with little more than a drag and a click. Need a lightning-fast total? Just click on the AutoSum (or SpeedSum or SmartSum) button.

Below the surface, there's even more power. Excel 4.0 includes functions for performing financial calculations and statistical measurements that used to be out of the reach of everyday business applications. And every leading Windows spreadsheet now has tools that let you use it as a powerful front end for industrial-strength data-management systems.

Of course, tapping into all that spreadsheet power isn't always easy, even when you find the right section in the manual. That's why we've gathered the best tips for Excel, Quattro Pro, and 1-2-3 in one place. Most show you how to take advantage of hidden new features, while a few steer you clear of hazards. Together, they'll help you get every ounce of power from your Windows spreadsheet.

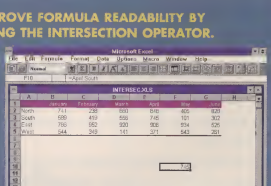
BY CRAIG STINSON

SUPERCHARGE EXCEL 4.0

Timesaving tips for making the most of Excel.

Excel continues to be the undisputed king of the Windows spreadsheets. Its smooth blend of power and usability propels it to the top of the sales charts month after month. The latest version features the much-imitated toolbar plus sophisticated analysis features and ChartWizards that automate the creation of high-end graphics from spreadsheet data. Whether you're a veteran Excel user or a new convert, you'll appreciate the valuable shortcuts in these tips.

IMPROVE FORMULA READABILITY BY USING THE INTERSECTION OPERATOR.



The space character is Excel's intersection operator, which means that a reference in the form *Address1 Address2* denotes the cell at the intersection of *Address1* and *Address2*. You can use this feature to improve the readability of your formulas. If you're working with a rectangular block of cells bounded by column and row labels, start by assigning names to each column and row in the block: Select the entire block, choose Formula, Create Names, and accept the defaults in the dialog box. Once you've done this, you can reference any cell in the block by its row and column names. For example, a cell at the intersection of a row labeled South and a column labeled April could be referenced as either April South or South April, as shown. To build a formula that adds the South figures for April and May, type =April South+May South. To sum a range of South figures—say April through June—type =SUM((April South):(June South)).

Use Ctrl-; and Ctrl-: to enter the current date and time.

Excel offers convenient keyboard shortcuts for date- and time-stamping your worksheet. To enter the current date, press the semicolon key while holding down the Ctrl key; to enter the current time, press the semicolon key while holding down both Ctrl and Shift (in other words, press Ctrl-colon).

After you employ either keyboard shortcut, Excel leaves you on the formula line in case you want to use the date or time string as part of a larger formula. So if you just want to find out the time, press Ctrl-; and read the information that appears on the formula line. Press Esc to continue working.

Press Ctrl-" to copy the value of the cell above.

Ctrl-" is Excel's ditto key. It copies the value from the cell above the one you're working in. If you're in A2, for example, pressing Ctrl-" enters the value of A1. If the cell contains a formula, this ditto-key shortcut gives you the value of that formula, not the formula itself.

Press Ctrl-' to copy the formula of the cell above.

Like Ctrl-", Ctrl-' copies the entry in the cell above it into the current cell. But there's a crucial difference: While Ctrl-" copies the value of the cell above, Ctrl-' copies its formula. Moreover, it copies this formula exactly, without updating relative references. For example, if cell C1 contains the formula =2*A1, and you type Ctrl-' at C2, Excel enters the formula =2*A1 in C2. If you were to perform this copy by dragging C1's fill handle or by using Edit Copy and Edit Paste, the result at C2 would be =2*A2.

Learn the keyboard shortcuts for Excel's Undo and Repeat commands.

The shortcut for Repeat is Alt-Enter, and the shortcut for Undo is Alt-backspace. Unfortunately, because of horizontal space limitations, Excel doesn't display these shortcuts next to the associated commands on the Edit menu. It does display a different shortcut, Ctrl-Z, next to the Undo command. Ctrl-Z works fine as an Undo

Create styles by example. You can define styles on your worksheet without ever visiting the Style dialog box. Just format the cells, click on the Style box, and type in a name. Voilà! You've defined a new style.

Change numeric precision one decimal place at a time. Two of Excel's handiest tools let you do this. To put them on your toolbar, select Options, Toolbars, Customize, Formatting, and drag them onto the toolbar.

Use icons instead of the Paste Special command. The paste-formats and paste-values icons bypass a menu process. The paste-formats icon is on the default toolbar; add paste-values by choosing Options, Toolbars, Customize, Edit, and dragging them onto the toolbar.

Microsoft Excel - BUDGET.XLS

File Edit Formula Format Data Options Macro Window Help

SumData

4Rx1C 17710

	A	B	C	D	E	F
2				June	July	August
3			Gross Revenue			
4			Sales	$27,000	$27,405	$27,816
5			Shipping	$5,550	$5,633	$5,718
6			*Total*	$32,550	$33,038	$33,534
8			Cost of Goods Sold			
9			Goods	$17,710	$17,869	$18,030
10			Freight	$270	$272	$275
11			Markdowns	$1,240	$1,251	$1,262
12			Miscellaneous	$96	$97	$98
13			*Total*	$19,316	$19,490	$19,665
15			Gross Profit	$13,234	$13,548	$13,869
17			Expenses			
18			Advertising	$4,000	$4,000	$4,000
19			Salaries	$4,700	$4,700	$4,700
20			Rent	$500	$500	$500
21			Utilities	$75	$75	$75
22			Insurance	$237	$0	$0

Ready

Double-click on a formula cell to select its precedent cells. Excel will select each cell referenced in the formula. If you can't see them all on one screen, press Enter repeatedly to move from one to the next.

Customize file types with templates. You can add to the list of file types that come up with the File, New command by storing a new template file—in this case, EXPENSES.XLT—in your XLSTART subdirectory.

shortcut, but you may find Alt-Enter and Alt-backspace easier to remember. Think of Enter as a go-ahead command and backspace as a signal to retreat.

To enter the same formula or value in many cells at once, select the range, type the formula or value, then press Ctrl-Enter. Ctrl-Enter saves you the trouble of replicating cell entries. When you terminate an entry with Ctrl-Enter, Excel behaves as if you had used Edit, Copy and Edit, Paste to copy the active cell into all selected cells, updating relative references in the process.

For a function's arguments, press Ctrl-A. Can't remember the order in which to enter arguments for the PMT (payment) function? Type =PMT, then press Ctrl-A. Excel supplies the opening parenthesis and fills out the remainder of the formula with the names of the required and optional arguments. Replace those argument names with the values or references you want to use. The Ctrl-A shortcut works with all of Excel's built-in and add-in functions. You can type it immediately after the function name or the opening parenthesis.

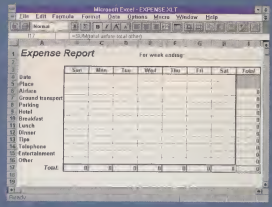
Use drag and drop for copies and moves. The simplest way to move a cell or range is often to drag it. Just position your mouse pointer on the border of the cell or range you want to move. When the pointer changes from a cross to an arrow, press and hold the left mouse button. Drag the selection to its destination and release the mouse button. To copy a cell or range, follow the same procedure but hold down the Ctrl key as you drag. *Note:* If the mouse pointer doesn't change from a cross to an arrow when it's on a cell boundary, you may have Excel's drag-and-drop features turned off. To turn them on, choose Options, Workspace, and select the check box labeled Cell Drag and Drop.

Double-click on a formula cell to select its precedent cells. If cell Z100 reads =AVERAGE(A1,B14,D13,C6:C12,X99) and you can't quite recall what's in each of those cells, just double-click on Z100. Excel will select each cell referenced in the formula. If you can't see them all at once because they're scattered over your worksheet, press Enter repeatedly. Excel will move from one member of the selection to the next, showing you the current value of each cell (on the worksheet) and the formula from which that value is derived (on the formula bar). If you double-click on a cell that contains an external reference, Excel will activate the external worksheet, loading it from disk if necessary. After you've inspected a cell's precedents in this manner, you can return quickly to the formula cell by using the Formula, Goto command. Goto presents a list of all your recent "went from" addresses. You'll find the cell you double-clicked on at the top of this list. Select it and click on OK, and you're back where you started.

To override Excel's worksheet defaults, create a template named SHEET and store it in the XLSTART directory. Are you tired of seeing grid lines on your worksheets? Open a blank worksheet, turn off the grid lines (with the Options, Display command), then use the Save As command to save the blank worksheet as a template. Name it SHEET.XLT and store it in the XLSTART directory.

Once you've done this, all new worksheets will open without grid lines. You can use this technique to automatically load virtually any of Excel's settings. For

STREAMLINE RECURRENT WORK WITH A TEMPLATE FILE.



Excel's Save As command includes an option that lets you save a file as a template. Template files can store labels, formats, formulas, and anything else that normal Excel files can store, and you can create templates from charts and macro sheets as well as worksheets. Templates are ideal for any kind of recurrent work, such as expense reports (shown here). To use a template, just load it from disk as you would any other file. Excel will make you give the file a new name when you save it, ensuring that your template remains intact and available to use again.

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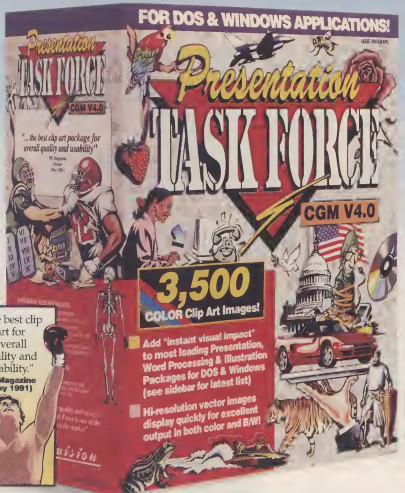

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PC Computing (May 1992)

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example, if you like to use Excel's center-on-page options when printing and you normally include your company name in printout headers, just set these options with the File menu's Page Setup command, then save your file as XLSTART\SHEET.XLT.

To have Excel always start with particular worksheets, macro sheets, or charts, put those startup files in the XLSTART directory.

If you like to begin Excel sessions with certain data files in memory, simply store them in XLSTART, and Excel will automatically load them each time you start the program. You can use this technique with all regular Excel documents, Lotus WK1 or WK3 files, and even text files.

To start Excel without a blank worksheet, add the line "open=/e" to your EXCEL4.INI file.

Excel normally presents a blank worksheet at the start of each session. If you typically throw that sheet away and load an existing file from disk, you can save yourself time and trouble by modifying your EXCEL4-.INI file. This is a plain-text file, similar in structure to WIN.INI, SYSTEM.INI, and other initialization files used by Windows. You'll find it in your Windows subdirectory.

Before modifying EXCEL4.INI, back it up. Then open the file with a plain-text editor such as Notepad. (Don't use a word processor or any other program that adds formatting information to the files it saves.) Look for the heading [Microsoft Excel]. Then add the line

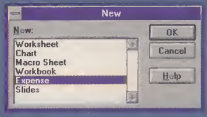
```
open=/e
```

Between that heading and the next bracketed heading (if there is any), save the modified INI file and start Excel. Voilà—no blank worksheet!

View the active cell and preserve cell selections with Show Active Cell.

Here's a typical situation in Excel: You've just selected a 40-row cell block and you're about to apply a command to this selection, but you need to take another look at the active cell. Unfortunately, you've scrolled it offscreen. If you use the cursor keys to redisplay the active cell, you break the selection. You can scroll it into view with Scroll Lock or by mousing up the scrollbar, but these are tedious, time-consuming procedures. Solution: Pull down the Formula menu and choose Show Active Cell. Simpler yet, press Ctrl-backspace, the keyboard shortcut for Show Active Cell.

FOR EASY ACCESS, STORE FREQUENTLY USED TEMPLATE FILES IN XLSTART.



If you find yourself using certain template files again and again, store them in the XLSTART subdirectory of your Excel program directory. (If you don't already have a directory named XLSTART immediately subordinate to the directory containing your Excel program files, you can use the Windows File Manager to create one.) When you use Excel's File, New command, any templates stored in XLSTART appear in Excel's list of file types. As shown in the example, if you store a template named EXPENSE.XLT in XLSTART, the list that appears when you choose File, New will include the standard choices, plus a new item called Expense.

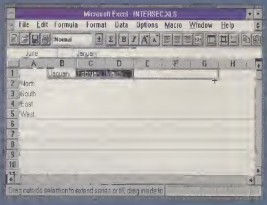
Create styles by example.

Named styles help you achieve a consistent look in your worksheets. Unfortunately, the complexity of the Format menu's Style command (and its associated dialog boxes) discourages many users from taking advantage of this feature. Fortunately, you can use styles effectively without ever visiting the Style dialog boxes. Just format cells in the normal manner, using Number, Font, and other Format menu commands. Whenever you think you might want to reuse some combination of formatting attributes—say, 12-point Arial bold italic with center alignment—just click on the style box near the left edge of Excel's standard toolbar. Then type a name, such as Main Heading, for your combination of formatting attributes, and press Enter. That's all you need to do to define a style. From then on, within the current worksheet, you can reapply those formatting attributes by selecting the cells you want to format, clicking on the down arrow next to the style box, and choosing the name of the style you want.

Use Autofill to replicate formulas.

You can use Autofill to copy a formula into an adjacent range, updating relative references in the process. Suppose cell D10 contains the formula =D9+C10. If you drag the fill handle to the right, you get =E9+D10 at E10, =F9+E10 at F10, and so on.

CREATE SERIES AUTOMATICALLY WITH AUTOFILL.



Perhaps the most brilliant usability innovation in Excel 4.0 is Autofill. This feature lets you create column and row headings, date and time series, and numeric series just by dragging with the mouse. To create a row of month headings, for example, type January (or Jan) in the first cell where you want the headings to appear. Then drag the little black square at the lower right corner of the cell (the *fill handle*), as shown. Excel fills the area with the succeeding month names. To create headings for every other month, type Jan in one cell and Mar in the next. Then highlight both entries before dragging the handle, and you get May, Jul, Sep, and Nov. (If you don't see a fill handle on the active cell, choose Options, Workspace and select Cell Drag and Drop.)

You can fill in any linear series of numbers or dates with Autofill. You can even use it to create a series of month-ending dates. (To do this, type two month-ending dates in adjacent cells, then drag the handle. If you type a single month-ending date, Excel will increment by days instead of by months.) You can also use this feature to create other common label series, such as Division 1, Division 2, and so on. If you extend a text item that ends with a number, Excel copies the text and increments the number.

Use toolbar icons to increase and decrease decimal precision.

Two of Excel's handiest toolbar icons—the **increase decimal tool** and the **decrease decimal tool**—let you change the precision of your current numeric format, one decimal place at a time.

For example, if a spreadsheet cell is formatted to show two decimal places, you can click twice on the first of these icons to display four decimal points. You won't find these icons on the default standard toolbar; they're located on the formatting toolbar. You can move them to the standard toolbar by selecting Options, Toolbars and then clicking on the Customize button. The icons are in the Formatting category. (Depending on your display's resolution, you may need to remove one or more tools from the default toolbar to make room for the newcomers.)

Use toolbar icons for pasting formats only or values only.

Occasionally you may want to copy only selected attributes of a cell, such as its value or display format. You can use the Paste Special command to accomplish this, but it's a time-consuming task, particularly since the Paste Special dialog box offers no fewer than ten radio buttons and two check boxes to choose from. To simplify this job, use the **paste-formats** and **paste-values toolbar icons.** The paste-format tool is the third tool from the right on Excel's default toolbar. To add the paste-value tool to the standard toolbar, select Options, Toolbars, click on the Customize button, and select Edit from the Categories list. Then just drag the paste-value tool onto the standard toolbar. (You may have to remove a default tool to make room.)

Use the Group Edit command to set up parallel worksheets.

Any time you need to enter the same data or the same formats into several worksheets at once, you can save yourself time by calling on the Group Edit command. Open all the sheets you plan to use, choose Group Edit (located on the Options menu), and select the name of each worksheet in the list box that appears. From that point on, any change made to the current sheet will be reproduced in all other worksheets in the group.

To get out of group-edit mode, choose Group Edit again and deselect the members, or simply navigate to one of the other group members by pressing Ctrl-F6, pointing with the mouse, or using the Window command.

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PC MAGAZINE EDITORS' CHOICE June 30, 1993 *FlexScan F560i*

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When you want to simultaneously view portions of a worksheet that are far apart, open a new window.

You can split an Excel worksheet window into horizontal or vertical panes, then freeze the panes, creating a setup similar to a split 1-2-3 window. An easier way to keep disparate sections of a worksheet in view is to open a new window, using the Window, New Window command. The second window can be sized and moved independently of the first.

Use scalable fonts.

Excel 4.0's default font is 10-point MS Sans Serif, a nonscalable bit-mapped font. Unless you require this font for compatibility with documents created in Excel 3.0 or you simply don't have any scalable fonts on your system, you'd do well to override this default. Swapping MS Sans Serif for Arial, for example, allows you many more sizing options without altering the basic appearance of your worksheets. If you use Excel's slide-show feature, you'll want to be working with scalable fonts because the utility routinely scales your slides to fill the screen.

One way to change the default is to open a blank sheet, change the font assigned to the Normal style, then save the worksheet as a template named SHEET in your XLSTART directory. Another way is to add a line to the [Microsoft Excel] section of your EXCEL4.INI file. To switch to 10-point Arial, for example, you would add this line under the [Microsoft Excel] heading:

```
font=Arial,10
```

For more about the EXCEL4.INI file, see the tip that begins, "To start Excel without a blank worksheet," page 155.

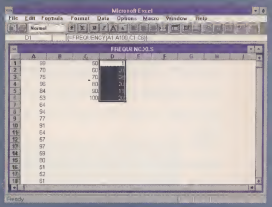
To quickly enter dollars-and-cents values, use the Fixed Decimal option.

The Fixed Decimal option in Excel's Options, Workspace dialog box lets you scale all input by a common factor. Setting this option to two decimal places, for example, allows you to enter $101.25 by typing 10125, $0.25 by typing 25, and so on. You can turn the option on and off at any time. If you're entering a long column of numbers, you can save additional keystrokes by choosing Options, Workspace, Move Selection after Enter.

Use the Data, Form command to add records to a database.

The simplest way to append data to an existing database is to use the Form command on Excel's Data menu. Click on the New button to tell Excel that you want to create a new record. Fill out the dialog box and click on Close, and your database automatically expands to include the new entry.

USE THE FREQUENCY() FUNCTION TO EMULATE 1-2-3'S /DATA, DISTRIBUTION COMMAND.



Rectifying a serious shortcoming of earlier versions, the developers of Excel 4.0 added both a command and a function for performing distribution analysis and generating histograms. Unfortunately, the command and the function treat distribution bins differently. If you are coming to Excel from 1-2-3 and want to create histograms exactly as you did in 1-2-3, you must eschew the Histogram command and rely on the array function FREQUENCY(). To use this function, first select the entire range where you want the distribution analysis to appear. Then type

=FREQUENCY(*input_range*, *bin_range*)

and press Ctrl-Shift-Enter.

Use RANDBETWEEN to create bounded random integers.

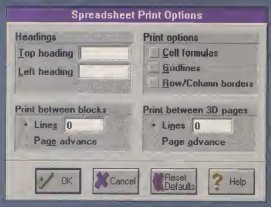
You can create a random integer between 1 and 100 with =INT(RAND()*100)+1; however, a much simpler way to get one is to type =RANDBETWEEN(1,100). The RANDBETWEEN function is included in ADDINFNS.XLA, a set of add-in functions that shipped with Excel 4.0. The function doesn't do anything you couldn't do yourself, but it's convenient if you have trouble remembering how to manipulate RAND(). To install the add-in, choose Options, Add-ins, Add, then select ADDINFNS.XLA.

TURBOCHARGE QUATTRO PRO

Secrets and shortcuts to get more from the Windows version.

Quattro Pro for Windows is loaded with innovations that make life in front of a spreadsheet easier. Its notebook metaphor, with tabbed pages that let you flip effortlessly between related worksheets, makes it a snap to manage multiple files. The right-mouse-button Object Inspector menu keeps formatting options a mouse-click away—there's no need to dig through menus. And its slide-show facility is second to none. If Quattro Pro is your Windows spreadsheet of choice, you'll find instant expertise in the following tips.

PRINT GROUPS OF PAGES SIMULTANEOUSLY.



If you use consecutive pages to store parallel worksheets—divisional expense figures, for example—you'll appreciate Quattro Pro for Windows' ability to print them all with one command. Select the block on the first page of the group, hold down the Shift key, and click on the page tab for the last page of the group. Then choose File, Print. In the dialog box that appears, click on the Options button. The "Print between 3D pages" section of the ensuing dialog box (shown here) lets you print each page on a separate piece of paper or everything together. If you decide on the latter, you can specify the number of separation lines. Once you've expressed your preferences, return to the Print dialog box and click on Preview to see how it will look.

Name your pages.

Assign names for each page when building multipage spreadsheet notebooks in Quattro Pro for Windows. The names will help you remember the structure of your notebook. Because page names can be used in formulas, they can also help you document your model's logic. For example, suppose the first four pages of your notebook are named 1990, 1991, 1992, and 1993. If you write a formula to average the values at cell F10 on each of the first four pages, Quattro Pro for Windows will automatically spell that formula like this: @AVG(1990..1993:F10), making it easier to read and understand than the equivalent @AVG(A..D:F10). To name a notebook page, right-click on its tab at the bottom of the worksheet grid. Quattro Pro for Windows will activate that page and display its Object Inspector. The first option in the Active Page Object Inspector lets you assign or edit the page's name.

Assign names to groups of pages.

You may also find it useful to assign names to groups of consecutive pages in order to create sections within your notebooks. For example, you could assign the name LastFourYears to a block of pages named 1990, 1991, 1992, and 1993. You could then create formulas that reference the entire page block by its name. For example, if pages 1990 through 1993 were named LastFourYears, you could find the average value of cell F10 on these four pages by writing the formula @AVG(LastFourYears:F10).

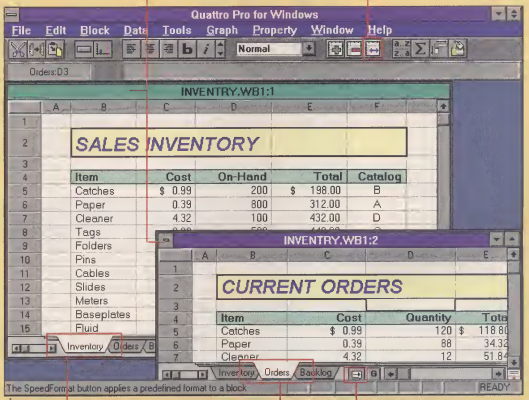
To assign a name to a group of consecutive pages, choose the Tools, Define Group command. In the dialog box, supply the name for the group, the first page of the group (either the page's letter coordinate or its name), and the last page of the group.

Don't use your printer driver's Setup dialog box to specify copies or orientation.

Quattro Pro for Windows' Print dialog box includes a Copies setting. To specify multiple copies of a printout, use this option, not the Copies setting in your printer driver's Setup dialog box—which Quattro Pro for Windows will ignore. Similarly, to switch between portrait and landscape orientation, use Quattro Pro for

View multiple pages on o single screen. Select Windaw, New View to apen onother view in the current notebook. Then click on onather notebook tab ta see two related worksheets ot ance. Each window can be sized and pasitianed independently.

Adjust column widths to fit. The Autamatic Width ican will adjust the width af o selected column to occommadate the largest number in the column.



Use the mouse for on instant SpeedBar reference. Simply pass the mouse orrow aver the icans on the SpeedBar, and a description of each icon's function appears in the messoge oreo ot the bottom of the screen.

Use page nomes for more readoble formulas. To name a worksheet page, right-click an its tob. Once yau've dane this, cells in that worksheet will be referred ta by their poge nome, for example Inventary:D5 ar Orders:E7, making crass-worksheet formulos easier ta decipher.

Take an express to the graphs page with the orrow icon. To get to the graphs page—the last page of ony Quottra Pra for Windows natebook—click an the arraw ican ta the left of the G symbal. In order to get back to the first page, hald down the Ctrl key and press Page Up, Hame.

Windows' Page Setup dialog box—not the Orientation setting in your Printer Driver Setup dialog box, which has no effect on Quattro Pro for Windows.

Use the Printer Setup command to redirect a printout to a disk file.

Quattro Pro for Windows' Printer Setup command makes it easy to send a printout to a disk file. Just select the check box labeled Redirect to File and specify a filename. The Browse button can help you locate files you've used before.

Use SpeedFill with discontinuous selections.

SpeedFill works with discontinuous selections. So you can use SpeedFill to create row and column headings at the same time by selecting the column headings, holding down Ctrl while selecting the row headings, and then hitting the SpeedFill icon.

Use Print Preview to check out color formatting on a black-and-white printout.

Your colorful worksheet may look dazzling on the VGA screen, but will it play on paper? Quattro Pro for Windows' Print Preview screen includes a Color button that removes some of the guesswork. Use this button to toggle your preview between color and monochrome. If the mono rendition looks muddy, try applying one of Quattro Pro for Windows' SpeedFormats to your print range. Several of these formats are designed specifically for monochromatic screens or printers.

To see two or more parts of a notebook at the same time, use the New View command.

The Window menu's New View command lets you open multiple windows on a common notebook file. Each new window can be sized and positioned independently. The New View command is handy when you need to see two or more notebook pages at once. You may also find it a convenient way to keep widely separated sections of a single notebook page in view.

To see what the SpeedBar icons do, pass the mouse over them.

If you have trouble remembering what each SpeedBar icon does, pass the mouse over the bar and read the text in the message area at the bottom of the screen.

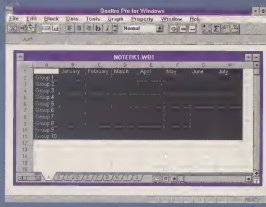
Put critical data on its own page, and turn on protection for that page.

Quattro Pro for Windows assigns the protected attribute to all cells by default but leaves protection globally disabled. To make the protection effective, you have to use an enabling command. Unlike other programs, however, Quattro Pro for Windows lets you apply the enabling command on a per-page basis. If there are portions of a model you don't want modified, put those elements on their own pages and turn protection on for just those pages. To enable protection for a page, right-click on its page tab. Then left-click on Protection and the Option button labeled Enable.

When linking Quattro Pro for Windows with another Windows app via dynamic data exchange or object linking and embedding, name the source range in the Quattro Pro for Windows worksheet.

Then use the client program's Edit Links (or equivalent) command to specify the name of the source range. When you create a DDE or OLE link between Quattro Pro for Windows and another Windows program using Quattro Pro for Windows as the server, name the range that supplies the data. Otherwise, rearranging your worksheet will invalidate the link. First select the range you want to copy, then choose Block, Name, Create, and supply a name for the range. Next copy the range by selecting Edit, Copy and finally paste the link in the client application.

CREATE ROW AND COLUMN HEADINGS AT THE SAME TIME WITH SPEEDFILL.



Create column and row headings in a single stroke with SpeedFill. For example, you can quickly fill in column headings for the months of the year and row headings for Group 1, Group 2, and so on, as shown. Type January at B1 and Group 1 at A2. Select the range you want to fill and click on the SpeedFill icon. Quattro Pro for Windows fills out the row and column.

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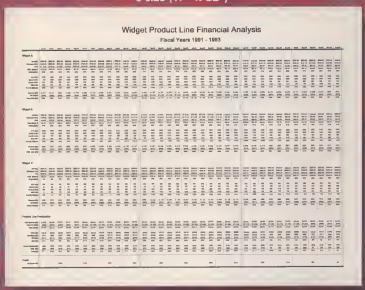

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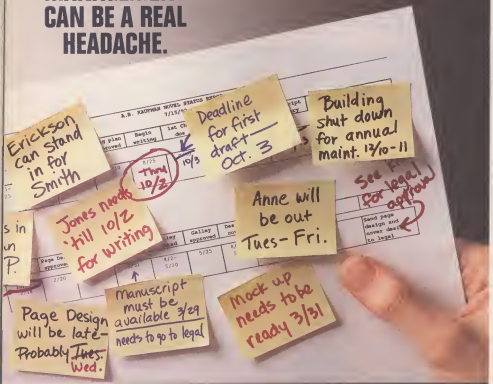
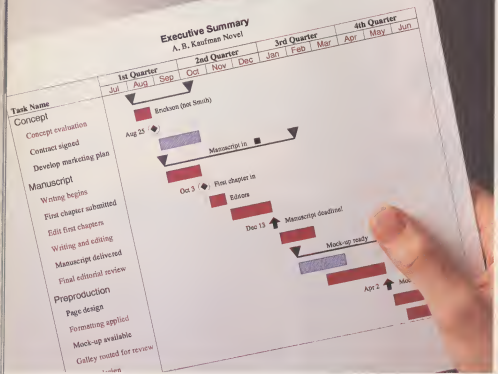
ON ONE HAND, PROJECT MANAGEMENT CAN BE A REAL HEADACHE.



ON THE OTHER HAND, WHY SHOULD IT BE?



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To simplify date and time entry, press Ctrl-Shift-D.

If you begin a cell entry by pressing Ctrl-Shift-D and typing a date in a recognized date format, Quattro Pro for Windows converts your entry to a serial date value and displays it as a formatted date. For example, to enter the date July 4, 1993, you can press Ctrl-Shift-D followed by 7/4/93 or 4-Jul-93. Quattro Pro for Windows will record the value 34154 and display it in the format you identified. You can enter times in the same manner. To enter 3 PM in a cell, for example, you can press Ctrl-Shift-D followed by 3:00 PM.

To move cells, use Block, Move rather than Edit, Cut and Edit, Paste.

Two different menu commands can be used to move Quattro Pro for Windows cells and ranges. You can transfer cells via the Clipboard, using the Edit, Cut and Edit, Paste commands, or you can use the Move command from the Block menu. Choose the latter; the former is dangerous.

If you cut and paste a formula cell via the Clipboard, any relative references it may contain are left unchanged—as they should be. If cell A3 has the formula +A1, and you cut and paste it to B3, it still says +A1 when it arrives at B3. But the Clipboard maintains a copy of that cut cell, and should you paste it a second time, Quattro Pro for Windows will (incorrectly) update its relative references. For example, if you paste the same cell a second time at C3, the formula changes to +C1—probably not what you had in mind.

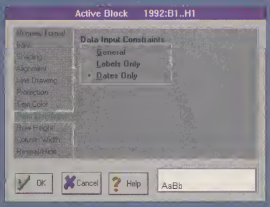
And that's not all. Suppose the cell you cut to the Clipboard is referenced by a formula somewhere else. Suppose, for example, that cell A4 contains the formula 2*A3. As soon as you cut A3 to the Clipboard, the formula at A4 returns 0 because it now references a blank cell. When you paste, all is well again. Paste at B3, for example, and A4's formula changes from 2*A3 to 2*B3. But if you're interrupted and forget to paste that formula, you're left with a damaged worksheet. Play it safe and stick with Block, Move for relocating worksheet cells. Reserve Edit, Cut for two purposes: moving graphical objects and erasing all attributes—contents and formatting information—from a cell.

To copy information across notebook pages, use Block, Copy and point to the target page tabs.

Block, Copy presents a simple dialog box with a From line and a To line. Your current selection appears as a default on the From and To lines. To specify the target for your copy, select the To line, then point. If the target is on a different notebook page, point to the target's page tab and specify the target range in that page. If you don't, the block will be copied to the upper left corner of the target page. Use this technique to copy a cell or range from one page into several pages at once. For example, to copy A1 . . F1 from page A to pages B through F, you could select A1 . . F1, choose the Block, Copy command, tab to the To line, click on the page tab for page B, hold down Shift, click on the page tab for page F, and then click on OK.

If you use Block, Move or Block, Copy to transfer or copy cells between notebooks, set up your windows so that both source and target ranges are visible.

IF YOU PLAN TO ENTER DATES IN A RANGE OF CELLS, ASSIGN THE DATES-ONLY DATA-ENTRY PROPERTY TO THAT RANGE OF CELLS.



If you have earmarked an entire range for dates, you may want to take advantage of another Quattro Pro for Windows' data-entry feature. Select the range and right-click anywhere within it to get the Object Inspector for the range. Choose Data Entry Input, then select the option button labeled Dates Only. Now begin entering dates in your range, in the format you want Quattro Pro for Windows to use for display. For example, type 4/23/93 if you want that date displayed in the "long international" date format. *Caution:* If you apply the dates-only data-entry property to a cell, you must remove that property before you can enter any other kind of data in the cell. Even if all you want to do is increment a date by appending a +1 to its value in the formula bar, you must remove the dates-only property.

The To and From ranges in a block move or block copy may reside in different notebooks, but you can't point to a target range in another notebook unless that range is visible onscreen. Therefore, if you plan to move data between notebooks with Block, Move or Block, Copy, it's a good idea to arrange your screen with the Window menu's Tile command before going to the Block menu.

To copy formats only, use Edit, Copy and Edit, Paste Special.

Block, Copy replicates all properties and contents of a range except for column widths. To transfer properties but not contents, use Edit, Copy instead of Block, Copy. Paste with the Paste Special command. In the Paste Special dialog box, deselect the Contents check box.

To erase the contents and formats from a cell or range, press Shift-Del.

Pressing Del in Quattro Pro for Windows deletes cell contents but leaves formatting information in place. To clean out a cell completely, returning it to its default conditions, press Shift-Del. This cuts the cell to the Clipboard, taking with it all properties except for column width and row height.

Use the Automatic Width icon to make columns wide enough to accommodate the largest number.

The double-headed blue arrow near the right side of Quattro Pro for Windows' default SpeedBar automatically adjusts a column's width to accommodate the contents of the current cell and any cells below in the same column. If you have spillover labels near the top of a column and you select any cell below the labels, the **Automatic Width icon** will adjust the column's width for everything below the labels, but it will continue to let the labels above spill into adjacent columns.

To hop to the graphs page, click on the arrow to the left of the G symbol.

The last page of any Quattro Pro for Windows' notebook is called the graphs page. All graphs associated with a file are stored here, along with any slide shows, custom dialog boxes, or custom SpeedBars you create. Contrary to your expectation, perhaps, the most direct route to the graphs page is not via the G symbol at the bottom of the notebook window (which puts you in group mode) but the arrow to the left of the G. Click there to go to the graphs page; click there again to return to the page you left.

To return to the first page in your notebook, you usually press Ctrl-Home. But this keystroke combo is inactive when you're on the graphs page. To get from there to page 1, you must return to a worksheet page, then press Ctrl-Home. One quick way to do this is to hold down the Ctrl key and press Page Up, Home.

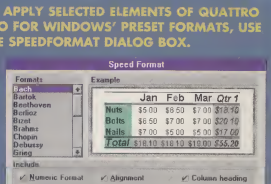
Use the File Name list to reopen a file.

Click on the drop-down arrow to the right of the File Name line in the File, Open dialog box to view the names of the files you opened during the current session. To reopen a file, just select its name.

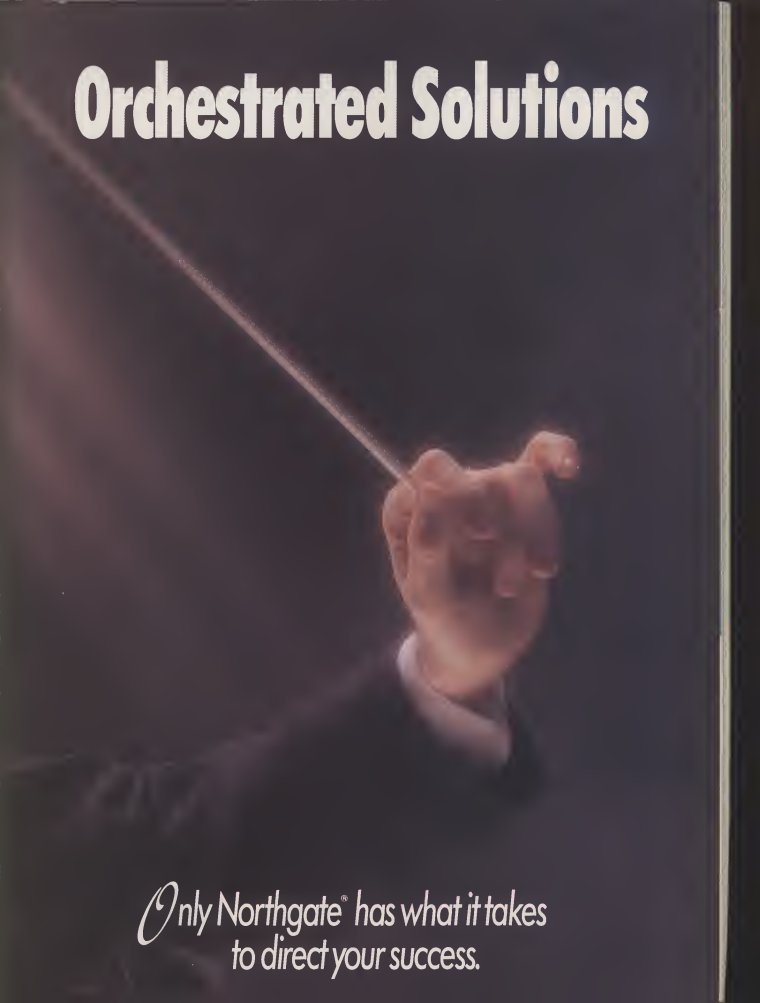
To find out what cell is causing the CIRC indicator to appear, enter the formula @curvalue("Audit","ShowCirc").

Users of DOS versions of Quattro Pro will recognize @curvalue as the function that returns the current setting of a menu command. For example, @curvalue-("file','save") returns the name of the file most recently saved. Quattro Pro for Windows' function set includes

TO APPLY SELECTED ELEMENTS OF QUATTRO PRO FOR WINDOWS' PRESET FORMATS, USE THE SPEEDFORMAT DIALOG BOX.



Quattro Pro for Windows' SpeedFormat icon offers a handy set of formatting combinations. You can use it to transform a drab block of numbers and labels instantly into something stylish. In some cases, however, you may want to use only selected elements of a formatting combo. If you like the colors and type styles but don't want the dollar signs, deselect the Numeric Format check box in the SpeedFormat dialog (shown above). Similarly, to skip the gray shading in the rightmost column and bottom row, deselect Column Total and Row Total.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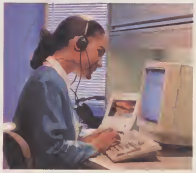

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@curvalue for the sake of compatibility with macros written in Quattro Pro for DOS. Many of @curvalue's acceptable arguments return nothing in Quattro Pro for Windows because of differences between the two programs' menu trees.

Quattro Pro for Windows includes a new function, @command, that returns current settings of various Quattro Pro for Windows' menu commands. When writing macros in Quattro Pro for Windows, therefore, you'll generally want to use @command, not @curvalue. But because Quattro Pro for Windows 1.0 lacks a few features found in Quattro Pro for DOS Version 4.0, there may be occasions when @curvalue is still useful. For example, Quattro Pro for Windows (unlike Quattro Pro for DOS 4.0) has no auditing facility. To find out what cell is causing a circular reference, you can use this formula:

```
@curvalue("Audit","ShowCirc")
```

Control Slide Shows with Hypertext Buttons

Put hypertext-style buttons on the graphs in your slide show so that it's easy to call up detail slides when they're needed. First, assemble a slide show on the graphs page: Hold down the Shift key and click on the graphs you want to include in the regular slide show, then click on the Create Slide Show button. Click on the Edit Slide Show button, and arrange the slides in the desired sequence. When you're done, click on OK to close the light table and return to the Graphs page.

Open the graph to which you want to add a hypertext button. Click on the Text button, then click and drag on the graph to create a text box. Type a title in the text box, then right-click on the background of the box. In the Box Properties dialog box that appears, select the Graph Button class of properties. Check the Select Graph box, and select the detail graph that you want to appear whenever you click on the text-box button. Specify the transition effects and the display time (select 0 if you want the detail graph to remain visible until you click on it). Specify any additional properties that you want the box to have, and click on OK to return to the graph. Close this graph, then open the detail graph. Add a button to the detail graph that returns you to the slide-show graph from which you started.

When you run your slide show, you can click on the background of any graph to move to the next slide in the show. If you've created a button on the current slide, click on that button to jump to the detail slide. Click on the detail slide's button when you're ready to return to the slide show and pick up where you left off.

CREATE CUSTOM NUMERIC AND DATE/TIME FORMATS.

Need a display format that's not included in Quattro Pro for Windows' default set? Use the Active Block property inspector. Select the block you want to format, right-click, and select User Defined at the bottom of the format list. In the right side of the dialog box (shown here), click on the arrow to see the drop-down list box, and define your custom format. You can use custom formats to replace a numeric display with text (for example, to hide cell contents with the word *Confidential*), add units to a numeric display, and so on.

Quattro Pro for Windows also lets you specify value-dependent display colors. This formatting feature, however, must be applied to entire notebook pages. To specify value-dependent colors, right-click on a page tab and choose Conditional Color.

To extend a selection, use the Shift key, or click once and reselect.

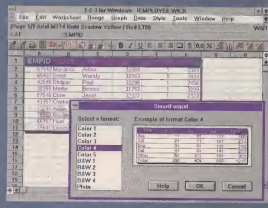
When you click on any selected block of cells, the pointer changes to a hand, indicating that Quattro Pro expects you to initiate a drag-and-drop maneuver. This behavior has both virtues and drawbacks. It makes it easy to drag and drop, but awkward to extend a selection. If you've already selected A1 . . A2, for example, and you want to add A3 to the selection, you can't simply drag the mouse from A1 to A3, because Quattro Pro for Windows will think it should relocate A1 and A2. The simplest way to extend the selection is to hold down the Shift key while clicking on A3 (or whatever cell you extend the selection to). Or you can click anywhere on the worksheet to break the original selection, and then drag the mouse from A1 to A3.

TAKE 1-2-3 TO THE LIMIT

Techniques for taming the Windows version of Lotus's classic.

If you're one of the millions of spreadsheet users who cut their teeth on the DOS version of Lotus 1-2-3, you'll appreciate the seamless compatibility between the Windows version and its character-based predecessor. The addition of Lotus's SmartIcon palettes—customizable, configurable collections of icons for accomplishing basic tasks—is the hallmark of 1-2-3's Windows incarnation. But you can still fall back on the Classic 1-2-3 menu by hitting that old familiar slash key. If you're a 1-2-3 devotee, you can take the Windows version to the limit with the tips that follow.

TO QUICKLY FORMAT A BLOCK OF CELLS, USE ONE OF SMARTPAK'S PRESET FORMATS.



The SmartFormat section of Lotus's SmartPak add-in (shown here) lets you choose from nine preset formatting combinations—five in color and four in black and white. You can use SmartFormat to enliven whole worksheet blocks at a single stroke. If you like to work with color on-screen but print in black and white, you may also want to use SmartFormat as a quick palette switcher. Before printing, select the range you're going to print, pull down the Tools menu, choose SmartPak, and then choose SmartFormat from the cascading menu. Finally, select one of the four black-and-white options in the dialog box that appears.

1-2-3 Be sure you have the latest version.
Lotus has provided three free upgrades to 1-2-3 for Windows since its release in fall 1991. Unless the company has begun shipping Release 2.0 by the time you read this, you should be working with Release 1.1, and you should also have received an add-in macro called SmartPak. If you don't have these items, request them from Lotus by calling (800) 872-3387, ext. 6866, or download them from the LOTUSA forum on CompuServe (GO LOTUSA). To check the version number, select Help, About 1-2-3, or check your disk labels.

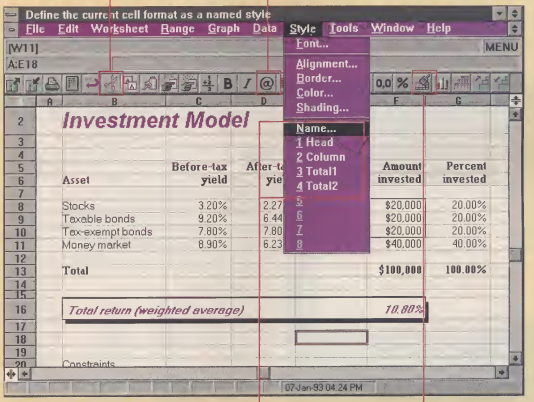
1-2-3 Don't use Edit, Cut/Edit, Paste to move cells.
There are three ways to move cells on a 1-2-3 for Windows worksheet: by using the Classic-menu /Move command, the Edit menu's Move Cells command, or cut and paste. Avoid the third—it can damage the logic of your worksheet. When you move a cell with the Edit, Cut and Edit, Paste commands, any relative references it may contain are updated. If cell A3 contains the formula +A1, for example, cutting and pasting it to B3 makes it read +B1. This does not happen when you use /Move or Edit, Move Cells. Moreover, if the cell you move is itself referenced elsewhere on the worksheet, the Edit, Cut/Edit, Paste procedure does not change the referencing formulas to reflect its new location.

1-2-3 Use SmartPak to create crosstabs.
SmartPak includes a CrossTab macro that lets you summarize information stored in a 1-2-3 for Windows database. Select the range you want to crosstabulate, then choose Tools, SmartPak, CrossTab. The macro will prompt you for a field for row headings, a field for column headings, and the field whose values you want to summarize. Choose from five statistical functions for the value field: @SUM, @AVG, @COUNT, @MIN, or @MAX.

One caveat: Because the CrossTab macro doesn't let you gather numeric or date values into groups, you may need to process your database before running it through the tabulator. For example, suppose you have a database that records financial transactions with fields named Date, Amount, Account, Payee, and

To completely cut out the contents of a cell or range of cells, use the scissors tool. The scissors tool—the icon equivalent of Shift-Del—removes the style attributes, numeric formatting, and contents of selected cells.

Use the @ icon for formula refreshers. If you have trouble remembering which @ functions you can use or how to spell them, use the @ icon. To add this SmartIcon to your palette, choose Tools, SmartIcons, and select the Customize button.



Position the SmartIcon palette to suit your style. This is the default position of the SmartIcon palette, but you can move it to the bottom or to either side, or bundle it into a floating block of icons. Simply select Tools, SmartIcons and select the position you prefer.

Assign names to your favorite styles. When you create a format you like, you can keep it for future use by selecting Style, Name. Just type in a brief name and description to make the style available for future use.

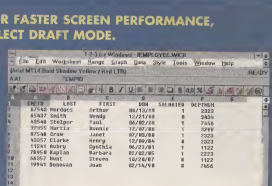
Copy style attributes and formats with the paintbrush. The paintbrush lets you copy style and numeric formats between ranges, but not the contents. Select the cells whose attributes you want to copy, click on the paintbrush, and drag the mouse arrow across the target range.

Category. If you want SmartPak to create a crosstab that shows how much you spent each month in each category, you'll need to create a field that extracts the month from each transaction date. Tell the CrossTab macro to use Category as its row field, Month as its column field, and Amount as the field to summarize.

1-2-3 To remove all style attributes from a range without deleting cell contents, use the Edit, Clear Special command.

You can remove numeric formats from a 1-2-3 for Windows range quickly and easily by choosing the Range, Format command and clicking on the Reset button, but there's no comparable button that lets you reset style attributes—color, shading, borders, alignment, and fonts. To restore default style settings to a range without deleting its contents, choose the Edit menu's Clear Special command. Then deselect the Cell Contents check box. *Caution:* 1-2-3 for Windows does not leave check box options the way you last set them, so even if you use Clear Special only to delete style attributes, you'll need to make the same check-box selections each time.

FOR FASTER SCREEN PERFORMANCE, SELECT DRAFT MODE.



1-2-3 for Windows' draft-mode display option provides faster screen performance. In this mode, shown above, the program ignores your style commands onscreen but still uses them on printouts. It also suppresses grid-line display, re-creating the unlined look of 1-2-3 Release 2.x and 3.x. You can toggle in and out of draft mode by choosing Window, Display Options, and selecting the Draft check box. To make draft mode the default, click on the Update button before you leave the Display Options dialog box. *Caveats:* In draft mode, you may select ranges by dragging with the mouse, but 1-2-3 for Windows won't highlight the selection. In addition, you cannot change column widths in draft mode by dragging with the mouse.

1-2-3 To clear a cell of style attributes, numeric formatting, and contents, press Shift-Del or click on the scissors SmartIcon.

Pressing the Del key erases a cell's contents but leaves the formatting and style information in place. You can clean a cell out entirely by using the Edit, Clear Special command with its default check-box settings, but it's easier to press Shift-Del: This cuts the cell and pastes all its attributes to the Clipboard, leaving you with a blank, unformatted, unstyled cell. The scissors SmartIcon is a mouse alternative for Shift-Del.

1-2-3 To copy the style attributes from one range to another without copying cell contents or numeric formats, use the Edit, Quick Copy command.

The Edit menu's Quick Copy command includes a check-box option that lets you copy style attributes—colors, fonts, alignment, borders, and shading—from one range to another. Use this command, rather than the format-painting SmartIcon, when you want to copy styles but not numeric formats.

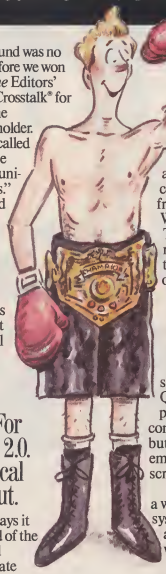
1-2-3 Use automatic formats to simplify date and time entry.

If you assign the Automatic format to a range of cells, you can enter dates and times without using formulas. For example, if you type 4/9/93 into an automatic-formatted cell, 1-2-3 for Windows recognizes your entry as a date and gives you 04/09/93. The same formatting technique allows you to enter currency values with dollar signs and commas. In general, if a cell has been given automatic format, you can type an entry in the manner in which you expect to see it displayed.

1-2-3 Let group mode help you set up parallel worksheet structures.

When 1-2-3 for Windows' group mode is on, style and formatting changes on one worksheet page are instantly copied into the rest of your worksheet. Changes to cell contents are not copied. To turn group mode on, choose Worksheet, Global Settings and select the group-mode check box. The word *Group* will appear in the status panel at the bottom of your screen.

The Heavyweight Champion Of Windows Comm Software Just Became Even More Of A Knockout.



The first round was no contest. Long before we won the *PC Magazine* Editors' Choice Award, Crosstalk® for Windows was the undisputed title holder. *Software Digest* called it the "best of the graphical communications packages." *InfoWorld* named it "Product of the Year." And it won the *Windows Magazine* Readers' Choice Award.

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New Crosstalk For Windows 2.0. A Technical Knockout.

PC World says it "jumps far ahead of the last version" and "advances the state of the art in modem software." And you can see the difference the minute you start it up. The interface is more functional, more convenient and just downright fun to use. A new QuickBar™ tool menu turns common tasks like downloading a file into a simple matter of clicking on an icon. And it follows Windows™ 3.1 interface standards to the letter.

But we didn't just put a new face on an old program. We also taught it a lot of new tricks. For instance, Crosstalk for Windows now includes FTTERM and IND$FILE support for connection to IBM® mainframes, as well as HP® and WYSE® terminal emulation. There's also a text editor built right in. You can edit information and send it out again, without leaving Crosstalk.

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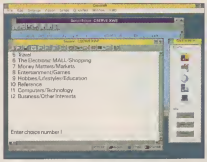

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> *Crosstalk for Windows sets the performance bar even higher for competitors in the Windows communications market.*
> —*PC World, October 1992*

You can even import dialing directories from the DOS version of Procomm Plus.™ (We want to make everything easy for you, including *switching* to Crosstalk.)

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1-2-3 Assign names to the style-attribute combinations you use most.

If you expect to use a particular combination of attributes in many places on a worksheet, save yourself a little trouble by using the Style, Name command. For example, suppose you plan to begin each page of a worksheet with a heading in 24-point Arial bold, centered across five columns, with red letters on a green stippled background. Start by assigning the appropriate style attributes to the first of these headings, then choose Style, Name. You'll see a dialog box with eight numbered slots. In the first slot, type a six-character name for the style (for example, Head01) and a description of up to 36 characters (for example, 24-Arial bold, red on shaded green). When you want to reuse this style combination, pull down the Style menu and choose the appropriate slot number.

Caution: You cannot assign numeric formatting to a named style.

1-2-3 To copy the style attributes and numeric formats between ranges without copying cell contents, use the paintbrush icon on the default SmartIcon palette.

The default SmartIcon palette includes a paintbrush icon that lets you copy style attributes and numeric formats, but not cell contents, from one range to another.

Select the range you want to copy, click on the **paintbrush icon,** then drag the mouse across the target range. The mouse pointer will change from an arrow to a paintbrush as you do this. The target range must be on the same worksheet page as the source range; 1-2-3 for Windows will let you move (by keyboard) to other pages and will appear to copy your source range—but no copy will occur.

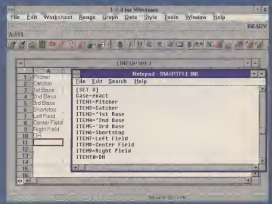
1-2-3 To convert a range from formulas to values, use Edit, Quick Copy.

To freeze the current values from a range of formulas, select the range, choose Edit, Quick Copy, check the Convert to Values box, and click on OK.

1-2-3 For draft-mode printouts from formatted worksheets, use /Print on the Classic menu.

As in Release 2.*x* and 3.*x*, /Print in 1-2-3 for Windows gets you a fast plain-text printout, no matter how your worksheet appears onscreen. Be aware, though, that even if you have previously specified a print range with the Windows-menu File, Print command, you will still need to tell /Print what range to print. File, Print and its Classic-menu counterpart (:Print) maintain one print range, and /Print maintains another.

USE SMARTFILL.INI TO CREATE CUSTOM SMARTFILL SEQUENCES.



SmartFill lets you design your own sequences. Suppose you frequently need to create the following set of labels: Pitcher, Catcher, 1st Base, 2nd Base, 3rd Base, Shortstop, Left Field, Center Field, Right Field, and DH. Use Notepad or another plain-text editor to open the file SMARTFILL.INI (it's in your 1-2-3 for Windows program directory), and add a new [SET #] section, as shown above. As soon as you save the modified INI file, you can use the new SmartFill set in your worksheets. (You don't have to restart 1-2-3 for Windows to make the additions available.)

Lotus provides you with two custom sequences as examples: one that enters the names of all of its Windows products and another to enter the names of the planets. Therefore, if you leave those examples in place, your first custom sequence will go under the heading [SET 3], the second under [SET 4], and so on. Each set can specify up to 99 items. If any of the items is a label beginning with a number (for example, 1st Base), you must include a label-prefix character: an apostrophe, a carat, or a double-quote mark, depending on your alignment preference. And if any of your entries begins with numbers or includes internal uppercase letters, add the optional line case=exact. Otherwise, if your first pattern entry begins with a capital letter, 1-2-3 for Windows will capitalize the first alphabetic character of every other entry, so you'll see 1St Base, 2Nd Base, and so on.

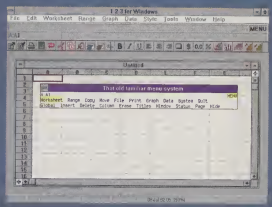
1-2-3 To print two or more ranges on the same page, use /Print.

The Windows-menu File, Print command automatically issues form feeds at the end of each print job. To group separate worksheet areas on a single page, you can use the Classic-menu counterpart. The program will print your selection without ejecting the final page. Then you can use the /Print, Printer Line command to advance the page a line or two, define your next print range with /Print, Printer Range, and so on.

1-2-3 To print multiple copies, change the Copies setting in your printer driver's Setup dialog box.

In porting 1-2-3 to Windows, Lotus disabled the Wysiwig Classic-menu :Print, Settings, Copies command. The command still appears in the Classic-menu box, but it does nothing. To get more than one copy of a printout, click on the Setup button in the File, Printer Setup command dialog box and change the number in the box labeled Copies. You can print as many copies as you want this way, but you'll have to collate them yourself. Be aware that 1-2-3 for Windows does not record your Copies setting when you save your file; the program resets this parameter to 1 when you quit.

RENAME THE CLASSIC-MENU WINDOW.



If you get tired of the 1-2-3 Classic moniker—or you just want to amuse your neighbors—open the 123W.INI file with a plain-text editor and modify the line that begins DCP=. You can give the menu window just about any title you want, as shown here.

1-2-3 To learn 1-2-3's Windows-menu equivalent for any command on the Classic-menu tree, select that command in the Classic window and press F1.

1-2-3 for Windows' help system eases the transition from Classic menus to Windows menus. If you press F1 while highlighting any Classic-menu command, a message appears telling you where to find the equivalent command on the pull-down menus.

1-2-3 When creating worksheet-linking formulas, tile your source and target worksheets so you can point to both sheets with the mouse.

Suppose you want to write a formula in SHEET2.WK3 that grabs the value at A1 of SHEET1.WK3. Both sheets are open in memory and you've maximized the current document window. You type a plus sign in SHEET2-.WK3 and click on the Window menu to activate SHEET1. 1-2-3 for Windows beeps; the Window menu, the scrollbars, and the SmartIcon palette are all unavailable while you're creating a formula. Fortunately, you don't have to write out that external-reference formula by hand. Start by tiling SHEET2 and SHEET1. Make sure both the cell you're working in and the cell to which you want to link are visible. Type a plus sign and point to the other worksheet. 1-2-3 for Windows will create the linking formula for you.

1-2-3 When copying an external-reference formula, use Quick Copy or SmartFill, not Edit, Copy and Edit, Paste.

If you copy an external-reference formula with Edit Copy and Edit, Paste, 1-2-3 for Windows treats the reference as absolute, even if you've written it to be relative. Worse, if you use Edit, Copy and Edit, Paste to replicate an external-reference formula into several adjacent cells at once, the reference will be treated as absolute in the first target cell and relative in each remaining target cell. To avoid these problems, use either Edit, Quick Copy or the SmartFill function included with SmartPak (see our first 1-2-3 tip, "Be sure you have the latest version," page 174).

1-2-3 If you have trouble remembering or spelling 1-2-3 for Windows' function names, put the @ icon on the SmartIcon palette.

The @ SmartIcon can simplify function entry. When you click on this icon, the program presents an alphabetic list of all available functions. You can then use the scrollbar or the cursor keys to locate the function you need. The @ **icon** is not part of the default SmartIcon palette, but you can

add it by choosing Tools, SmartIcons and selecting the Customize button. If you're working on a standard VGA screen, you may need to remove an icon from the palette to make room for the addition.

1-2-3 Turn off the gray background for 1-2-3 for Windows' dialog boxes and formula bar if they make the program hard to read on an LCD screen.

If you find the gray background used by 1-2-3 for Windows' dialog boxes a hindrance on an LCD screen, turn it off by modifying 123W.INI. Open the file with a plain-text editor, such as Notepad. Search for the line that begins Great_looking_dialogs= and replace whatever's to the right of the equal sign with a 0. Save the file and restart 1-2-3 for Windows.

1-2-3 Click on each SmartIcon with the right mouse button for a description of the icon's function.

Most of Lotus's SmartIcons are self-evident. It's not hard to remember, for example, that the *B* applies or removes boldfacing. But a few are less obvious—will you remember that the green hand means "Select the range to move to" and the yellow hand means "Select the range to copy to"? Fortunately, if you point the cursor at any icon on the palette and hold down the right mouse button, 1-2-3 for Windows displays the icon's description. (Note, however, that while you're in the Customize dialog box, right-clicking does nothing. In this box, you need to left-click to get an icon's description.)

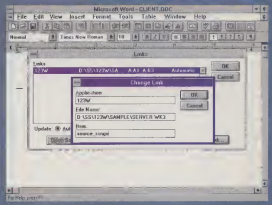
1-2-3 If you're running low on memory, turn off Undo.

1-2-3 for Windows' Undo command consumes quite a bit of memory. If you're working with very large files, you may need to turn off Undo. Choose Tools, User Setup, and remove the check from the Enable Edit Undo box. Note that if the MEM indicator appears at the bottom of your screen, you may first need to quit the program. Then restart, turn off Undo, reload your file, and try again.

1-2-3 If you usually print with a particular combination of Page Setup options, make it the default.

You can set up 1-2-3 for Windows so that it prints the name of your company at the top of each page, the date at the bottom, and so on. You can make any combination of the program's Page Setup options the default by visiting the Page Setup dialog box, setting the options you want, and clicking on the Update button.

FOR ACCURATE DYNAMIC DATA EXCHANGE, NAME THE SOURCE RANGE IN YOUR 1-2-3 FOR WINDOWS WORKSHEET.

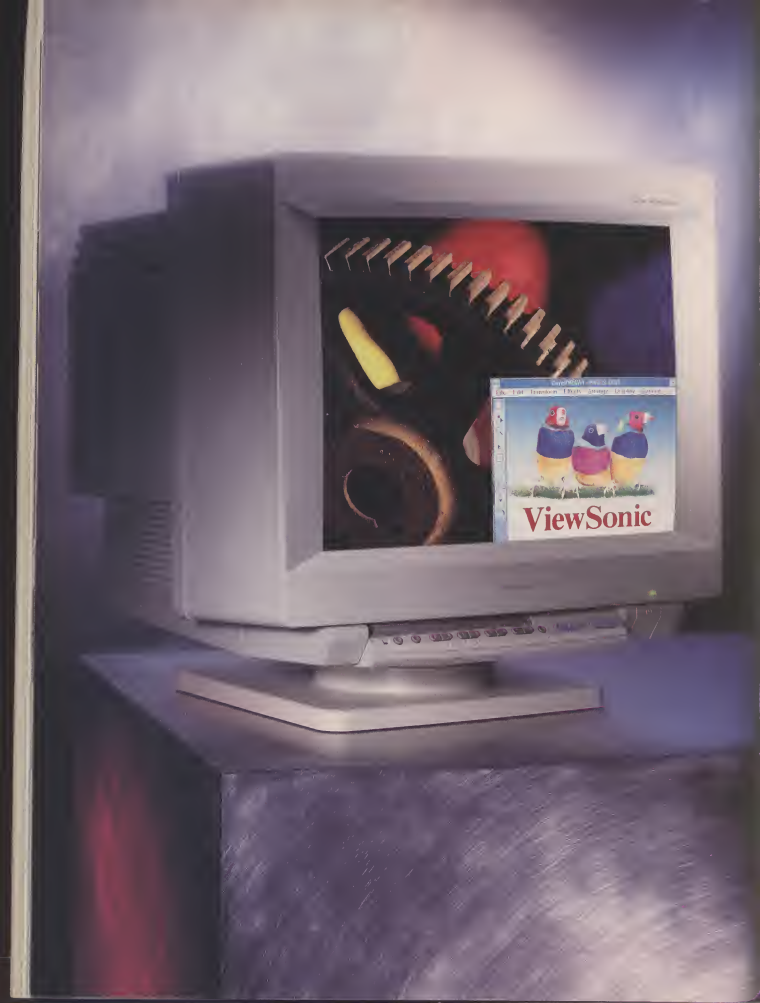


Then use the client program's Edit Links (or equivalent) command to specify the source range.

Any time you create DDE or OLE links using a Windows spreadsheet program as the server, it's important to name the cells containing your source data. Otherwise, changes to your worksheet layout can cause your link to pick up data from the wrong cells. Unfortunately, 1-2-3 for Windows' Edit Copy command fails to put range names on the Clipboard. So even if you have named a range prior to creating a link with, say, a Word for Windows document, the link will be recorded in Word for Windows by the source cell's row-and-column coordinates, not its assigned name. You can fix this problem (after creating the link) by using the client program's procedures for editing links, as shown above for Microsoft Word for Windows.

1-2-3 If you frequently use several combinations of Page Setup options, store them as named settings.

1-2-3 for Windows' Page Setup dialog box has a Save button that lets you record a file's settings. If you use particular headers and footers, margin settings, or other printing options again and again, save time and ensure consistency by encapsulating those settings in files. Click on Save and supply a filename (1-2-3 for Windows adds the extension .AL3). When you want to reuse a setting combination, go to the Page Setup dialog box and click on Retrieve.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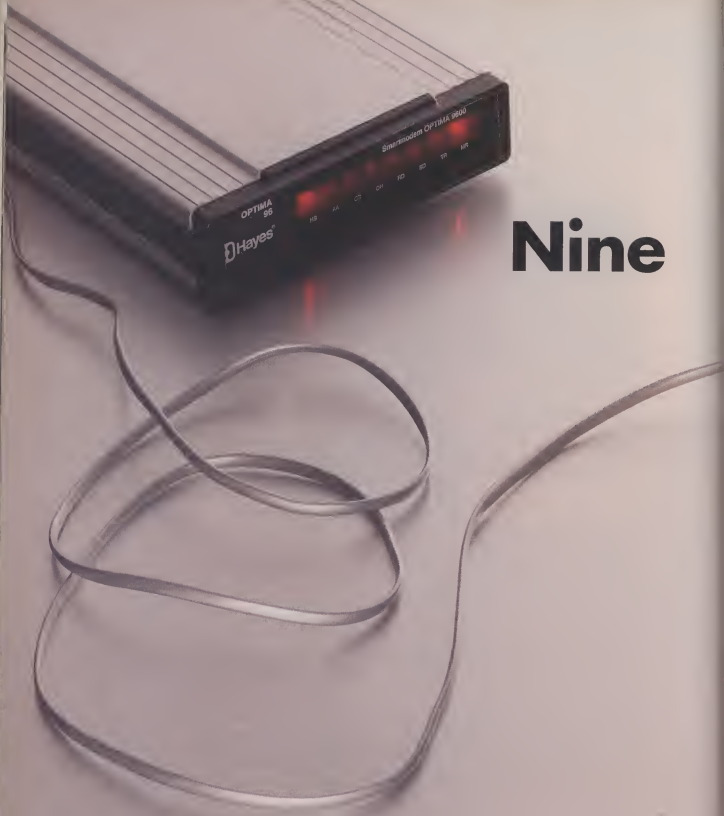
Circle 186 on reader service card.



Nine

PHOTOGRAPHY BY TAN HONG

COMMUNICATIONS GET GRAPHICAL

Windows Solutions

BY JOE SALEMI

At last! Windows communications software that's robust, fast, and reliable.

LET ME GUESS. You've got a modem, and you run Windows on your PC. Most of the programs you run are also Windows applications. But when it's time to log on to CompuServe or MCI Mail, you rely on the DOS-based communications programs that have served you so well for so long.

If you're an old hand at Procomm or Crosstalk Mark 4, you may see no point in learning a GUI-based application. But listen up—there's more to the new generation of Windows communications programs than a pretty interface.

First, a Windows communications program gives you direct access to dynamic data exchange (DDE), so you can download information or files directly into another Windows-based program. With a DOS program, you'd have to download the data, save it in a text file, and then import it into your spreadsheet or database. Under Windows, you can simply create a DDE link between the programs, and the data will automatically be passed right into your spreadsheet—with no intermediate steps required. (Object linking and embedding is another Windows facility for moving data between programs, but as yet none of the Windows communications programs utilizes the technology.)

Another big advantage is smoother multitasking, which is particularly important when you're transferring a large file in the background. When you run a DOS communications program in the background, you have to increase its background priority setting in the program information file so that it can transfer files without losing characters or data. The net effect is that your foreground programs run slower. Even with a higher setting, you might still experience data loss, which results in constant resends, slowing down the transfer. In this case, you'd have to run the communications program in Exclusive mode, which slows other processes even more.

A Windows-based communications program takes advantage of Windows' built-in task scheduling, which ensures that all of the currently running programs have access to the CPU and disk without adversely affecting each other. There's less danger of losing data during long file transfers and of significantly slowing down programs running in the foreground.

PICKING THE PROGRAMS Our selection criteria for the programs included in this review were simple. Every program had to support communication speeds of 9,600 bits per second or better, include some type of script or macro language for automating common tasks, and support DDE. Nine Windows-based communications pro-

grams qualified: Crosstalk for Windows, DynaComm, MicroPhone Pro for Windows, Mirror for Windows, Procomm Plus for Windows, Relay/PC (formerly MicroCourier), Relay/PC Gold for Windows, Terminal Plus with Faxit, and Unicom. All are commercially available, except for Unicom, which is shareware. Crosstalk for Windows, Relay/PC Gold for Windows, and Procomm Plus for Windows share some features with their DOS versions. The rest were designed exclusively for Windows, or they were ported to Windows from the Macintosh environment.

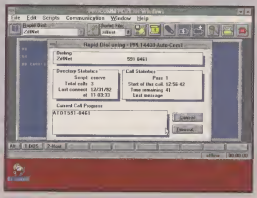
We tested every program by calling both ZiffNet and a BBS to assess any included scripts. In addition, we tried the built-in implementations of the Zmodem and CompuServe-B file-transfer protocols to be sure that the programs could properly transfer the test files (we used Ymodem if either of these wasn't supported). While we didn't run any formal benchmark tests, we tested the programs by downloading a 531K file in both the foreground and the background. While downloading in the background, we had a Lotus 1-2-3 for Windows spreadsheet constantly recalculating in the foreground to test the effect of a CPU-intensive process on the transfer rate. The majority of the programs showed no ill effects during the background tests. While downloading in the background, we also ran a disk-intensive database sort in the foreground, and the results were consistent across the board: Every background transfer experienced a slowdown.

MAKING THE CALL What's the best Windows communications program for you? That depends on what you want it to look like and what you want it to do. The programs range from those with a simple terminal screen to ones with complete icon bars or button bars (or both) that control common tasks, send keystrokes to the host

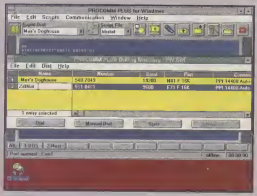
BEST VALUE

THE POWER SOLUTION

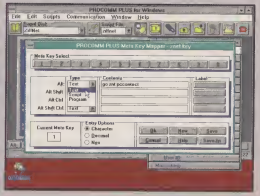
Datastorm's Procomm Plus for Windows 1.01 packs a lot of power for only $179. Its ASPECT script language rivals many programming languages and lets the power user or communications application developer automate the entire communications process. It supports all the major file-transfer protocols and terminal emulations and makes it easy for even the nonprogrammer to automate common tasks.



The drop-down list in the icon bar *activates scripts once you've created or modified them; the "running man" icon lets you know that the script is being executed. Up to 40 meta-key definitions can be created and saved in a separate file for each online service that you use.*



The dialing directory *is the heart of Procomm Plus for Windows. You can associate scripts, meta-key definitions (the meta keys are the buttons across the bottom of the screen), and keyboard remappings with each entry, in addition to the usual communications parameters.*



A meta key *for ZiffNet is being designed here as a text (or keystroke) macro. Meta keys can also be associated with ASPECT scripts or external programs.*

PC, and even execute scripts. If you want to start out simple but will use such specialized features as you master your program, look for one that lets you turn the advanced features off.

Other considerations narrow the field further. If you're moving up from a DOS-based program, your best choice is the Windows version of that program, or one that functions similarly. If you're not bound by product loyalty, seek out the program that best meets your communications needs. To make that a little easier, we've identified best values for the corporate user, the power user, and the budget-minded user.

Because Windows isn't the only graphical user interface around, we've also considered two communications programs that run on OS/2's Presentation Manager. And finally, we offer some suggestions for increasing the stability and performance of your communications program when you run it in the background.

BEST VALUE

CROSSTALK FOR WINDOWS 2.0

Crosstalk for Windows 2.0 is a powerful and full-featured communications program that's completely customizable. It supports the IBM mainframe-based IND$FILE file-transfer protocol and is suitable for both the casual user and the corporate user.

PROS: Compatible with Crosstalk Application Script Language (CASL), so scripts can be imported from DOS versions; supports the Windows multiple document interface (MDI), which permits multiple active communications sessions with a single copy of the program.

CONS: Resource intensive; requires Windows 3.1 yet doesn't support many of its features.

$195 ■ DCA (Digital Communications Associates) ■ 1000 Alderman Dr., Alpharetta, GA 30202-4199 ■ (800) 348-3221, (404) 442-4930

Crosstalk for Windows was initially criticized for not supporting CASL; Version 2.0 not only solves this problem but also provides utilities to convert Crosstalk Mark 4 dialing directories and Crosstalk XVI script files to a usable format. At $195, it's a great value for those who don't need fax capabilities.

■ **Feature Highlights** Crosstalk for Windows' best features are its customizability and its MDI support. Every action it takes is based on a script, which gives you complete control over how the program dials a service and what it does once you're connected. MDI lets you run multiple scripts concurrently, so you can communicate with different services simultaneously without having to start new sessions of the program. Crosstalk for Windows also uses the MDI to provide user-designed QuickPads, customized icon and button bars that can be used to automate common tasks. The icons or buttons can be associated with a single action or a whole script. QuickPads can be used in addition to the standard icon bar and can be toggled on and off via one of the icon bars.

Crosstalk for Windows, like its DOS cousins, displays the dialing directory on startup. Unlike DOS versions, each directory listing in the Windows version is actually a script. In addition to all the common file-transfer protocols, Crosstalk for Windows supports the proprietary Crosstalk and DART protocols, as well as the IND$FILE protocol that transfers files between a PC and an IBM mainframe. There's also support for accessing shared modems over a LAN using the INT14 and NASI/NCSI interfaces.

■ **Multitasking** Crosstalk for Windows showed a very slight slowdown of just under 2 seconds out of more than 8 minutes when it was transferring files in the background. Otherwise, it performed flawlessly. The minimized-icon text reports on the status of the currently running script, but it doesn't inform you of the progress of file transfers.

■ **Scripting** The best news is Crosstalk for Windows' support for CASL, which is the powerful scripting and application-development language used by Crosstalk Mark 4 and Communicator. The Windows version supports different screen-handling commands from the DOS versions, so some minor editing may be required before you move an existing script to Crosstalk for Windows. CASL scripts can be edited through the built-in script editor or with any ASCII text editor, and then compiled for speed and security. The program includes scripts for a number of online services, as well as template scripts that speed the process of creating new directory entries.

■ **Problems and Disadvantages** The only problem we encountered in Crosstalk for Windows was a bug in the included CompuServe log-on script that sometimes prevented us from accessing ZiffNet. Recreating the script from the installation disks and reentering the account information solved the problem.

Crosstalk for Windows is the most resource-intensive of the programs we examined; it requires at least 400K more RAM than Windows by itself does. It also took noticeably longer than other programs to load, and it lacks support for Windows 3.1 features such as drag and drop and multimedia. Its compatibility with DOS versions and a variety of transfer protocols, however, make it the best choice if you don't need fax support in your communications program.

DYNACOMM 3.1

DynaComm 3.1 validates the program's reputation as one of the best Windows communications options available for personal and business use. New features include multimedia support, a graphical aid for remapping the keyboard, and an enhanced icon bar.

It could be worse.
We might've stored our
data on something else.

Verbatim® tapes, optical and floppy disks. Your best defense against data loss.

Circle 143 on reader service card.

PROS: Support for virtually every LAN modem-sharing protocol available; powerful script language that's compatible across the whole line of FutureSoft products.
CONS: Limited support for Windows 3.1.

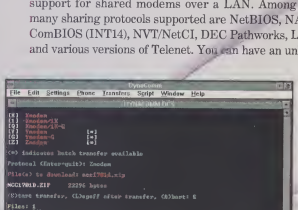
$249 ■ FutureSoft Engineering ■ 1001 S. Dairy Ashford, Suite 101, Houston, TX 77077 ■ (800) 989-8908, (713) 496-9400

The Terminal program that comes with every copy of Windows is a very limited, scaled-down version of FutureSoft's $249 DynaComm communications program. Among the many features the full package provides are all the major file-transfer protocols, a powerful script language, and greater user control over the program's appearance.

■ Feature Highlights DynaComm 3.1 is one of a family of products that includes a Macintosh version, specialized Windows versions that emulate minicomputer and mainframe terminals, and a simplified version called Terminal Plus (also reviewed). Scripts written under one version can be used with any other version, usually with little modification.

DynaComm has always provided a completely customizable, four-level keystroke button bar that simplifies and automates online actions normally executed with function keys or mouse clicks. Version 3.1 extends the concept to a full toolbar with icons that you can customize. You can remap the keyboard by graphically linking each key to a function. DynaComm 3.1 also includes multimedia support under Windows 3.1, or under 3.0 with multimedia extensions.

Business users will appreciate DynaComm's complete support for shared modems over a LAN. Among the many sharing protocols supported are NetBIOS, NASI, ComBIOS (INT14), NVT/NetCI, DEC Pathworks, LAT, and various versions of Telenet. You can have an unlimited number of dialing directories, and each directory can have its own icon in the DynaComm group. Clicking on the directory icon automatically starts DynaComm and loads the directory.



DynaComm's terminal window includes a customizable toolbar across the bottom of the screen, which can display either icons or text. A status bar at the bottom of the terminal screen displays the transfer status.

■ Multitasking DynaComm 3.1 showed no slowdown while running in the background during the CPU-intensive foreground application test. When the program is transferring a file, it displays the current percent of a file sent or received, and the estimated time remaining in the file transfer. When the program requires attention, the icon pops to the top and flashes. The script language provides full DDE support.

■ Scripting DynaComm's script language is its most powerful feature; it rivals Procomm's ASPECT in capabilities for programming customized communications applications and the user interface. Numerous sample scripts demonstrate the language's power. These include a Rolodex, a file-finder, multimedia demonstrations, and two games. Scripts can also be assigned their own icons in the DynaComm group; clicking on one automatically runs the program and the script. You can compile scripts to prevent inadvertent changes and use them with few (if any) modifications by other versions of DynaComm.

■ Problems and Disadvantages The only problem we encountered with DynaComm was a slightly muddy text appearance when we used the included ANSI-BBS terminal emulation with the default font. Changing to a different font helped considerably. Though DynaComm 3.1 includes multimedia support, the program doesn't take advantage of any other Windows 3.1 features, such as drag and drop. Users who chiefly use Windows 3.1 may be better served by one of the other communications programs, such as Procomm Plus for Windows.

MICROPHONE PRO FOR WINDOWS 1.0

MicroPhone Pro for Windows is the Windows version of a popular Macintosh communications program. It takes advantage of many Windows 3.1 features, such as drag and drop and multimedia, but lacks features found in other programs that cast less.

PROS: Four send-and-receive support; support for Windows 3.1 features such as drag and drop, TrueType, and multimedia.
CONS: Limited number of file-transfer protocols supported.

$195 ■ Software Ventures Corp. ■ 2907 Claremont Ave., Berkeley, CA 94705 ■ (510) 644-3232

Software Ventures bills its $195 MicroPhone Pro as "the most advanced telecom software for Windows," but the product doesn't quite live up to the hype. MicroPhone Pro is one of only two Windows communications packages that require Windows 3.1 (the other is Crosstalk for

THE OTHER GUI: OS/2 SOLUTIONS

Though it's by for the most popular, Windows isn't the only GUI environment available for 386 and better PCs. OS/2 2.0's Presentation Monager (PM) and WorkPlace Shell (WPS) GUI gives users the some DDE copobilities as Windows. It's also o notive multitasking operoting system, ond its support for multitosking communicotions sessions is in many woys more robust than Windows'.

In oddition to supporting multiple DOS sessions, OS/2 2.0 has built-in support for Windows 3.0, so you con run oll but two of the reviewed Windows communications programs under it. A version of OS/2 2.0 that includes Windows 3.1 support is being beta-tested os we go to press. It may be ovoilable by the time you read this. OS/2 2.0 also provides DDE support between Windows programs, and between Windows and OS/2 programs, so you con create DDE links between the communications program and other applications with ease.

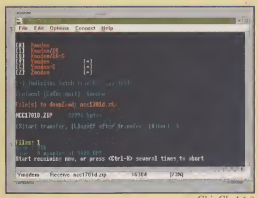
There ore two woys to install a Windows-bosed communicotions program in OS/2: If you've olreody installed the program in Windows, boot OS/2. Run the Migrote Applications utility found in the System Setup folder to copy all the oppropriate informotion from your Windows directory, ond create on icon for the progrom in o folder on the WPS desktop. You con then run the progrom in windowed form or full screen directly from OS/2. Or you con install the progrom directly into OS/2 by storting a full-screen Windows session from the icon in the Commond Prompts folder. Once the program is installed, you con run it from the Windows OS/2 session or manually add it to one of the folders on the WPS desktop to run it directly from OS/2.

The limited success of earlier versions of OS/2 hos kept mony developers from writing communicotions programs thot toke odvantoge of the PM interface. At this time, there ore only two GUI-bosed OS/2 communicotions programs: ChipChot, from Cowthon Software Group, and PMComm, from Multi-Net Communications.

ChipChat 1.3

$299; Cowthon Software Group, 24224 Michigon Ave., Deorborn, MI 48124-1897; (313) 565-4000

ChipChot is the older, and ot $299 the more expensive, of the two OS/2 communicotions programs. Unfortunately, its oge shows; it's still only o 16-bit program thot works with OS/2 1.3 or 2.0. A 32-bit OS/2 2.0 version is due to be releoseo by summer. The current version hos only o few predefined modems, primarily from Hoyes ond IBM, ond olso locks both the Zmodem ond CompuServe-B file-transfer protocols, and the only scripting support is through keystroke macros. ChipChot supports DDE with other OS/2 applications, both directly ond through the OS/2 clipboard. It olso optionally supports multiple users through o shored



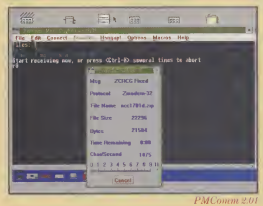
ChipChat 1.3

modem on an IBM LAN Server or Microsoft LAN Monoger network. However, its limitotions greatly outweigh the odvantoges these features provide.

PMComm 2.01

$89.95; Multi-Net Communications, 15702 Black Bear Court, Klomoth Folls, OR 97601-9008; (800) 235-7789, (503) 883-8099

PMComm is the best OS/2 GUI-based communicotions program ovoilobe; ot $89.95 (plus $5 shipping ond hondling), it's olso one of the least expensive for ony operating environment. PMComm supports ol the mojor file-transfer protocols os well os the mainfrome IND$FILE protocol. Scripts con be created with the internol script longuoge or with the REXX extended batch-commond longuoge included with OS/2 since Version 1.2. PMComm 2.01 comes with o 16-bit version for OS/2 1.3 ond o 32-bit version for OS/2 2.0 on one disk. DDE support with other OS/2 progroms is provided through the clipboord ond is occessed via o script that uses REXX commonds. It olso hos on icon bor os port of the status line on the bottom of the terminol screen. PMComm is very eosy to set up. It wos originolly o shorewore program: You con still download Version 1.10 from ZiffNet ond various BBS's.



PMComm 2.01

Windows 2.0), and it takes full advantage of many 3.1 features. It also includes support for sending and receiving faxes if you have a fax card or modem. Unfortunately, it lacks support for both the CompuServe-B and Kermit protocols, which limits its usefulness for heavy users of CompuServe and ZiffNet as well as for those who need to exchange files with corporate minicomputers and mainframes via modem. If you don't need fax capabilities, you can find a better deal.

■ Feature Highlights MicroPhone Pro's two best features are its fax capabilities and its excellent integration with Windows 3.1. Send-and-receive fax capabilities are provided through a copy of Delrina's WinFax Lite and through a script file that automates the faxing process. You can send faxes immediately or schedule them for transmission when long-distance rates are lower. Faxes can be sent through a supported fax board or through most Class 1 or Class 2 fax/modems.

MicroPhone Pro is the only product of the bunch that lets you use TrueType fonts in addition to the regular Windows screen fonts in the terminal screen, offering great flexibility in how the screen appears. It also provides full drag-and-drop support; to send a file, for example, drag a text file from the File Manager and drop it on an icon representing a fax recipient in the fax window.

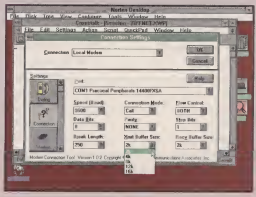
MicroPhone Pro supports a variety of modems at speeds up to 115,200 bps; V.32bis modems; and direct connections. Its standard configurations can be easily customized for unsupported modems. And specialized drivers support COM ports 1 through 9, as well as the most common protocols for shared modems on a LAN.

■ Multitasking We found no problems or slowdowns while running MicroPhone Pro in the background when the CPU-intensive spreadsheet recalculation was

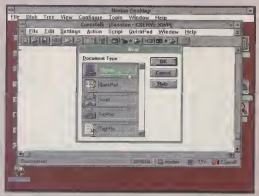
BEST VALUE

THE CORPORATE SOLUTION

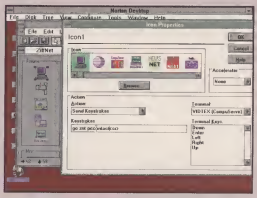
In this category, **Crosstalk for Windows 2.0** from DCA wins hands down. Its support for mainframe terminal emulations, transfer protocols, and shared modems on a LAN makes it ideal for corporate use. That it provides all these features for only $195 makes it a bargain compared to Reloy/PC Gold for Windows, its nearest competitor.



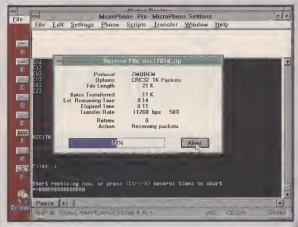
***The drop-down boxes** are used for setting the various parameters. In addition to the icon bar, there's a pop-up QuickPad for automating online actions. Each icon or text choice can send keystrokes, start a file transfer, or run a script.*



***In Crosstalk for Windows**, everything is treated as a document (a type of script). A pick-list menu gives you a choice of documents to create; here we're creating a new session (a dialing directory entry) for ZiffNet. Once Crosstalk creates the new session document, you use the Connection Settings dialog box to enter the phone number, communications parameters, and default modem.*



***Creating a QuickPad icon** for ZiffNet's PC/CONTACT forum is simple. Just click on the icon to send the keystrokes to the host.*



MicroPhone Pro's terminal screen can have action buttons across the top. A replica of modem status lights appears in the lower-right corner. Transfers are indicated by both text and graphics in a pop-up window.

running in the foreground. When MicroPhone is minimized during a file transfer, the text below the icon shows the name of the file and the amount that's been transferred both in kilobytes and as the percentage of the total. At other times, the icon text displays the current state of the program, such as what service it's connected to.

■ Scripting MicroPhone Pro's scripting capabilities are excellent, with numerous commands that automate communications and customize screen appearance. Scripts can be created or modified through the built-in editor, which guides you through the process with pick lists and dialog boxes; you can also import a script from an ASCII text file. Scripts are saved in a tokenized format to speed up processing.

The package includes numerous prewritten scripts for automating access to major online services such as MCI Mail, CompuServe, and GEnie. Another script automates sending and receiving faxes and maintaining a fax address book. New commands support Windows 3.1 multimedia features and let you add sound or full-motion video to scripts. The package also includes a script that demonstrates MicroPhone's multimedia capabilities by playing an audio CD in a CD-ROM drive. There's also a script bank that contains prewritten modules for icon-bar buttons that you can use in your custom scripts. Adding the module to a script is as simple as dragging it from the bank and dropping it on the current terminal window.

■ Problems and Disadvantages MicroPhone Pro was very easy to get up and running, and we didn't have any problems connecting to various online services. Adding new services to the dialing directory or changing the settings for existing services can be a bit confusing, however, as there are a number of routes to the various option dialogs. The dialing directory is a welcome addition to MicroPhone, but it needs to be better integrated with the rest of the package.

MicroPhone Pro's biggest disadvantage is the lack of the CompuServe-B and Kermit file-transfer protocols; it's the only program we reviewed that doesn't have them. The fact that MicroPhone Pro only supports Windows 3.1 is also a minor disadvantage.

MIRROR FOR WINDOWS 1.1

Mirror for Windows is SoftKlone's first Windows 3.0 or higher communications program; however, unlike DOS versions of Mirror, it's not compatible with Crosstalk XVI. It's a basic, no-nonsense communications program that doesn't require a lot of system resources.

PROS: Simple to install and use; supports a variety of common LAN modem-sharing protocols; requires minimal resources.

CONS: No cross-compatibility with DOS versions of Mirror; no icon or button bar.

$195 ■ SoftKlone ■ 327 Office Plaza Dr., Suite 100, Tallahassee, FL 32301-2776 ■ (800) 634-8670, (904) 878-8564

SoftKlone is known for its DOS Mirror communications programs, which are script-compatible with DCA's Crosstalk XVI. The $195 Mirror for Windows 1.1 breaks with that tradition, and its macro language is brand-new. It doesn't demand a lot of system resources—if you have enough RAM to run Windows, you have enough to run Mirror for Windows.

■ Feature Highlights Mirror for Windows is a straightforward, no-frills communications package that makes it very easy to get online. The Connect menu automatically drops down when you start the package, and you only have to click on the Entries choice to display the dialing directory and start your calls. You can even add frequently called services directly to the Connect menu, which saves you a few mouse clicks. The software supports the majority of common modems and connects to shared modems on a LAN through the INT14, LAT, NCSI/NASI, and various Telenet interfaces.

■ Multitasking Mirror for Windows was one of two programs we tested that experienced a slowdown when transferring files in the background while the CPU-intensive task was running in the foreground. However, the difference was little more than 2 seconds out of over 8 minutes of transfer time, which would hardly be noticed by most users.

When the file transfer begins, the main terminal window is automatically minimized, and a separate file-transfer window (which can also be minimized) pops up. The text under the minimized icons describes the current status of the program. DDE support is provided through the clipboard or macro commands.

It's not surprising WordPe
Microsoft Word for Wind

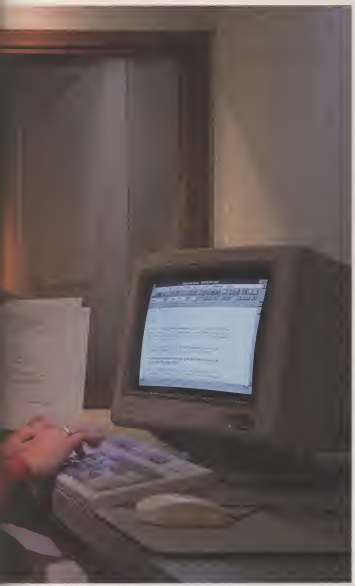
At last count, more than half a million WordPerfect® for DOS users have moved to the number one word processing software for Windows™: Microsoft® Word version 2.0 for Windows. And there are plenty of good reasons why.

First of all, WordPerfect for DOS users actually helped us to make Word for Windows easier to use.

During the development of Word for Windows, we invited WordPerfect

Each year shows approximate total number of users who have switched. For more information inside the 50 United States, call (800) 426-9400, Dept HY5. Outside the U.S. and Canada, call (206) 936-8661. Customers in Canada, call (8

rfect users are switching to ows. They helped define it.

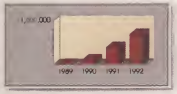


users to try it out on the things they do every day at work. We call these types of sessions "usability studies." They help us find out the way in which people use their computers, and how we can make it easier for them.

In this case, we were able to design features that can make not only your everyday work easier, but also the transition from WordPerfect.

Like the customizable Toolbar. It gives you one-step access to inserting bullets and printing envelopes. Word for Windows can also take all your familiar commands in WordPerfect, and then display the equivalent commands. So you can learn while you're working on your everyday tasks.

From November 1989 to August 1992, over half a million WordPerfect users have switched to Microsoft Word for Windows.*



We even had the National Software Testing Labs put Word for Windows to the test in ten cities across the country. The result was that nearly 8 out of 10 WordPerfect users preferred Microsoft Word for Windows for ease-of-use over WordPerfect for Windows.

But they're not the only ones who prefer Word for Windows. Recently, it received numerous industry awards, including "Best Buy" by *PC World,* and "Editors' Choice" by *PC Magazine.*

To find out how easy it is to make the switch to Word for Windows, just give us a call at (800) 426-9400, Dept. HY9. And then spread the Word.

Microsoft®
Making it easier

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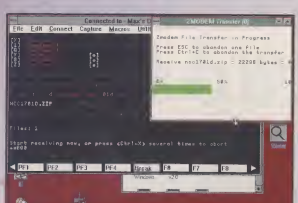


Mirror for Windows' simple terminal screen has customizable text representations of the function keys across the bottom. Minimal text and a sliding bar indicate transfer progress in a separate window.

■ **Scripting** Macros can be created or modified through the built-in editor and are usually stored in one large ASCII text file. You also have the option of saving new macros to a different file. Scripts are neither compiled nor encrypted. Mirror for Windows' macro language is complete but complex. It gives you full control over both communications events and screen appearance. Because of its complexity, most users will find it easier to use the Learn mode to record their log-on actions and then modify the recorded macro if necessary.

■ **Problems and Disadvantages** We encountered some problems with file transfers during our initial test in which Mirror for Windows caused general protection faults (GPFs) at random points. SoftKlone's technical support confirmed that there is a bug in the compiler used to create the executable file dated 12/11/92. Versions with this file date are still in the sales channel; if you purchase a copy of the software with this date, call SoftKlone's technical-support line for a corrected version. Mirror lacks an icon bar or customizable buttons. Users who prefer their screens uncluttered, however, won't even miss these features.

BEST VALUE

PROCOMM PLUS FOR WINDOWS 1.01

Procomm Plus for Windows is essentially a new version of the powerful and popular DOS program of the same name. The ASPECT script language has been updated and refined to give application developers more control over the program's appearance, making this version as much a communications programming environment as it is a communications tool.

PROS: Some compatibility with DOS-version scripts; handy utilities that can help you customize your windows and dialog boxes.

CONS: Fewer file-transfer protocols than the DOS version; limited drag-and-drop support.

$179 ■ Datastorm Technologies ■ P.O. Box 1471, Columbia, MO 65205 ■ (314) 443-3282

While Procomm Plus for Windows performs admirably as an everyday communications program, its strength lies in its ASPECT script language and developer utilities. Casual users will find it a joy to use, while communications programmers will find it the best environment for creating customized and fool-proof communications applications. Other than having fewer transfer protocols than the DOS version (though all the major ones are present), we found little to complain about in Procomm Plus for Windows—it's the best communications value around.

■ **Feature Highlights** Procomm Plus for Windows has many fine features. Chief among them is the icon bar that's combined with drop-down windows from which you select the service to call or script to run. The visual appearance of most of the icons changes when they're active. For example, the running figure icon actually "runs" when a script is active. Additional icons appear on the bar if you're running the program with an 800-by-600 Windows screen driver. Also available are *meta keys,* customized Alt-*number* key combinations that can send keystrokes to the host PC and run scripts and external programs. Both the meta keys and the icon bar can be toggled on and off.

Under Windows 3.1, Procomm Plus for Windows supports drag and drop, though it's limited to capture files, ASPECT scripts, and dialing directories. The program includes a GIF format viewer that also supports drag and drop and can run standalone or from within Procomm Plus for Windows. You can view the GIF as it's being downloaded. Other important features include full control over file-transfer and communications-port settings; extended and customizable settings for each dialing directory entry; different options for the startup action, such as automatically running a script or displaying the dialing directory; and automatic resizing of the terminal screen to accommodate the current font.

■ **Multitasking** Procomm Plus for Windows had no problems maintaining the transfer rate in the foreground or background, regardless of what else was running. The minimized icon text displays the name of the file being downloaded along with an estimate of the time remaining, and also pops up to the foreground and flashes when the program needs attention.

Full DDE support is provided through direct links or through the clipboard.

■ **Scripting** The ASPECT script language has always been the strongest feature of the DOS version, and

that tradition continues in Procomm Plus for Windows. Scripts can be written to completely automate online and offline actions; a sample script automates writing MCI Mail messages offline, uploading them to the service, and downloading any mail received. The Windows version of ASPECT is compatible with most DOS scripts, but not with the commands that control screen actions or the DOS environment.

Converting scripts from one version of the program to the other requires some effort; however, there's a chapter in the reference manual that describes the conversion process. A User Window Builder makes it easy to create custom windows and terminal screens, and a User Dialog Box Editor makes it easy to customize dialog boxes. Both can be integrated into ASPECT applications. Procomm Plus for Windows automatically compiles the scripts to speed execution and protect the script from inadvertent modifications.

■ Problems and Disadvantages Procomm Plus for Windows' only real disadvantages are that it supports only the major file-transfer protocols and doesn't let you add external drivers. DOS-version users who are accustomed to the SEALink or Telelink protocol will have to switch protocols when moving to the Windows version. This isn't a major problem, though, as virtually every online service and BBS supports some version of Xmodem, Ymodem, or Zmodem. Otherwise, Procomm Plus is the best Windows communications program available.

RELAY/PC

Relay/PC (formerly MicroCourier), a scaled-down version of Relay/PC Gold for Windows, is designed for the casual communications user. It suffers from the same limited use of Windows features as Relay/PC Gold, so it's not as capable as its nearest competitor, Terminal Plus.

TRICKS FOR TROUBLE-FREE COMMUNICATIONS

Despite the simplicity of a point-and-click interface, running a communications program under Windows isn't necessarily trouble-free. Higher communications speeds (9,600 bits per second and faster) increase the risk of data loss; as more data is moved during each CPU cycle, there's a greater chance that the communications program's buffer will overflow while another program has the CPU's focus. File transfers also involve more frequent disk accesses as the data is read to or from the hard disk. Windows gives priority to disk accesses, which takes processing time away from other programs and slows down the system. But forewarned is forearmed: Here's how to reduce common difficulties.

• Manage multiple tasks. This is the easiest way to avoid problems, especially disk access problems. If you're transferring a large file in the background, don't run any disk-intensive foreground tasks until the transfer is done. The most common disk-intensive task is a large database sort. You should also avoid running print jobs of more than a page or so. Windows tends to give the CPU and disk priority access to the print spooler, and a large job could cause the file transfer to slow way down or stop completely. And realize your PC's limitations; a fast 486 system with a lot of RAM is much better at handling multiple tasks (especially high-speed communications) than a 286 with 1MB of RAM. Experimentation will determine the best mix for your system's capabilities.

• Improve your serial port. Most PCs still come standard with the 8250 or 16450 serial port universal asynchronous transmitter-receivers (UARTs); the IBM PS/2s and Compaq EISA systems are notable exceptions. You can improve background or any high-speed communications by replacing the stock UART with a 16550AFN or equivalent chip. The 16550AFN has a built-in 16-byte buffer that holds the data until the communications program is ready to receive it, which helps guard against data loss.

Unfortunately, most new PCs have the UART wired into the system board. The only way to add a 16550AFN is by disabling the built-in serial ports and adding a serial card with a socket that can accomodate the new UART. There are also serial boards that come with the 16550AFN already in place; the most common is the Hayes ESP board ($299; Hayes Microcomputer Products, P.O. Box 105203, Atlanta, GA 30348; 404-840-9200), which has two serial ports with two 16550s. Many internal high-speed modems also come with a 16550 built in.

• Improve your serial port driver. Bio-Engineering Research Laboratories (180 Beacon Hill Lane, Ashland, OR 97520; 503-482-2744) sells the TurboCom serial port driver for Windows 3.x. This $47.50 (plus $5 shipping and handling) driver enables all the special features of the 16550AFN UART for both Windows communications programs and DOS communications programs running under Windows (which the built-in driver doesn't do). TurboCom supports speeds of up to 115,200 bps. While there have been reports of some speed improvements when TurboCom was used with an older UART, the company recommends using it with a 16550AFN or equivalent chip.

• Upgrade to Windows 3.1. The serial port driver that comes with Windows 3.1 is notably better than 3.0's; it even has limited support for the 16550AFN UART's built-in buffer. Version 3.1 also manages multiple tasks better than previous versions.

PROS: Simple to use; offers a subset of Reloy's script language.
CONS: Lacks many features Windows users toke for gronted; lacks Reloy/PC Gold's support for lorge host systems.

$99 ■ Relay Technology ■ 1604 Spring Hill Rd., Vienna, VA 22182 ■ (800) 795-8674, (703) 506-0500

Relay Technology recently purchased the Relay/PC and Relay/PC Gold for Windows products from Microcom Systems. Relay/PC lacks the excellent support for terminal emulation and file transfers between a PC and a large host system that is found in Relay/PC Gold for Windows (see the next review). It's better than the Terminal utility included with Windows, but at $99 it does not employ as many Windows features as the identically priced Terminal Plus program from FutureSoft. Relay/PC will primarily appeal to those users who are looking for a simplified version of Relay/PC Gold for Windows.

■ Feature Highlights Relay/PC's appearance and most of its functions are identical to Relay/PC Gold's. It shares the same limited Quick Buttons bar and tear-off status line. The menu bar is simplified: The Session options are distributed among other pull-down menus. Unfortunately, the program shares Relay/PC Gold's confusing array of configuration options and its lack of context-sensitive help.

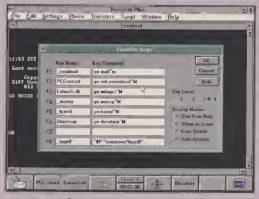
The biggest difference between the two programs is that Relay/PC does not have Relay/PC Gold's 3270 terminal-emulation support or support for various LAN shared-modem protocols. The only sharing protocol supported is INT14.

■ Multitasking We didn't encounter any problems or slowdowns when we downloaded files in the background with Relay/PC. As with Relay/PC Gold, the only way to keep an eye on the progress of the file transfer

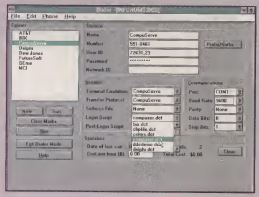
BEST VALUE

THE LOW-COST SOLUTION

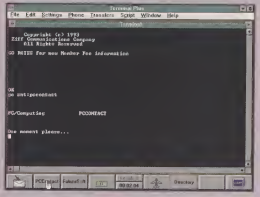
Terminal Plus 3.1 with Faxit *from FutureSoft wins our recommendation for casual users who want inexpensive Windows communications software. This easy-to-use $195 package ($99 in the most basic version) supports all of the most popular file-transfer protocols and lets you automate your communications through scripts and a toolbar.*



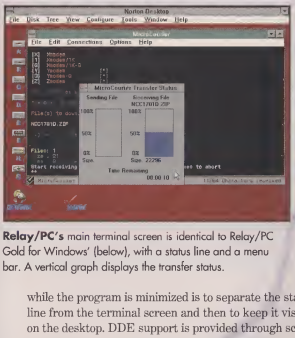
Setting up function key commands is easy *in Terminal Plus. Here, we've created one for our PC/Contact forum on ZiffNet. You can also access the same forum with the toolbar option at the bottom left of the screen.*



The basic dialing directory screen *includes drop-down menus for setting most options. A number of log-on scripts are provided with the package, and you can create your own through the Learn Script menu choice. Once you've set up the service and dialed in, you can easily modify the toolbar to automate your online actions through a function key or mouse click.*



Clicking on the toolbar button *sends the text to the host as if it were typed in through the keyboard.*



Relay/PC's main terminal screen is identical to Relay/PC Gold for Windows' (below), with a status line and a menu bar. A vertical graph displays the transfer status.

while the program is minimized is to separate the status line from the terminal screen and then to keep it visible on the desktop. DDE support is provided through script commands.

■ **Scripting** Relay/PC uses a subset of the Relay script language. Relay scripts will run without modification, provided that they don't rely on any of the special terminal-emulation functions or protocols missing in Relay/PC. The product ships with a sample script for calling CompuServe and a tutorial script.

■ **Problems and Disadvantages** We didn't have any problems running Relay/PC, though we had to be sure to install the latest "zaps" (the program's name for batch files) to ensure that everything worked correctly. Relay/PC's disadvantages are the same as Relay/PC Gold for Windows', particularly its limited use of Windows features. Another consideration is that the new owners of the program have not yet decided on its future. For the same cost, FutureSoft's Terminal Plus would be a better choice for casual users looking for a simple-to-use yet capable Windows communications program.

RELAY/PC GOLD FOR WINDOWS

Relay/PC Gold for Windows' main strength is its terminal and file-transfer support for a number of minicomputer and mainframe operating systems, particularly those using the IBM 3270 protocols. Otherwise, it's an expensive, plain-vanilla communications program that doesn't provide the features many Windows users expect.

PROS: Excellent terminal emulation and connection support for minicomputers and mainframes; script language compatible across the entire Relay/PC product line.

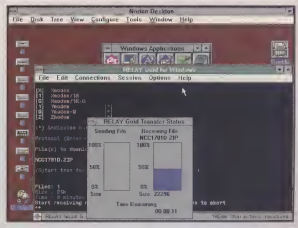
CONS: Expensive; lacks many standard Windows features found in other products.

$399 ■ Relay Technology ■ 1604 Spring Hill Rd., Vienna, VA 22182 ■ (800) 795-8674, (703) 506-0500

Relay/PC Gold for Windows 5.0b is the final version released by Microcom before it sold the Relay products to Relay Technology. It's difficult to say what effect the change of ownership will have on the program; however, the new owners are emphasizing mainframe applications programming, so it's a reasonable assumption that the company will continue Relay's strong terminal-emulation support for larger host systems.

■ **Feature Highlights** Relay/PC Gold for Windows offers an abundance of options for connecting to or acting as a terminal for large host systems, primarily as a 3270-type terminal for IBM mainframes. The program supports a number of 3270 emulation boards, including the Irma boards from DCA and IBM's own boards. A Relay/PC terminal can also act as a remote 3287 printer to a mainframe, by routing the printer output to a PC-attached printer. The program also supports the mainframe-based IND$FILE file transfer, as well as its own mainframe-PC file transfers when that PC is connected to Relay modules that run on the host system.

■ **Multitasking** Relay/PC Gold for Windows experienced no slowdown while transferring a file in the background. The main icon doesn't reflect the status of the program; the only way to know what's going on is to detach the bottom status line by clicking on it and dragging it away from the rest of the terminal window. The status line will then stay open while the rest of the program is minimized and report on file-transfer progress. The script language provides DDE support.



Relay/PC Gold for Windows' main screen has only a menu bar and status line. A pop-up vertical graph provides minimal file-transfer information.

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WINDOWS COMMUNICATIONS PACKAGES

	BEST VALUE CORPORATE			
	Crosstalk for Windows 2.0	**DynaComm 3.1**	**MicroPhone Pro for Windows 1.0**	**Mirror for Windows 1.1**
Price	$195	$249	$195	$195
RAM required	400K above Windows requirement	640K conventional plus 256K extended	640K conventional plus 256K extended	640K
Windows version supported				
3.0 or higher	○	●	●	●
3.1 only	●	○	●	○
Windows features supported				
Drag and drop	●	○	●	○
Multimedia	○	●	●	○
Other	MDI	MDI	MDI	○
Fax support				
Class 1	○	○	●	○
Class 2	○	○	●	○
File transfer protocols				
Xmodem	●	●	●	●
Ymodem	●	●	●	●
Zmodem	●	●	●	●
CompuServe-B	●	●	○	●
Kermit	●	●	○	●
Others	Crosstalk, DART,	YTerm IND$FILE	○	○
Scripting features				
Compiled scripts	●	●	●	○
Encrypted scripts	●	●	○	○

● = Yes ○ = No

BEST VALUE POWER USER			BEST VALUE LOW-COST	
Procomm Plus for Windows 1.01	**Relay/PC**	**Relay/PC Gold for Windows**	**Terminal Plus 3.1 with Faxit**	**Unicom 3.1**
$179	$99	$399	$195	$69.95
640K	640K	640K	640K	2MB
●	●	●	●	○
○	○	○	○	●
●	○	○	○	●
○	○	○	●	○
○	○	○	MDI	○
○	○	○	●	○
○	○	○	●	○
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
○	Relay	IND$FILE, Relay	○	External protocol support
●	○	○	●	○
●	○	○	●	○

■ **Scripting** Relay/PC's script language is powerful enough to create sophisticated communications applications. However, its main thrust is toward automating sessions with 3270-type hosts. A few sample scripts demonstrate some of the language's capabilities, but there are no predesigned scripts for online services.

■ **Problems and Disadvantages** We had no problems setting up or running Relay/PC Gold for Windows. However, we did find it somewhat confusing to configure, because while there are many options for each setting, there's no context-sensitive help. Besides offering DDE support, Relay/PC takes little advantage of the Windows interface. For example, the only way to utilize keystroke shortcuts is through the optional QuickBar, which simply presents ten numbered buttons in place of the vertical scroll bars on the right side of the terminal screen. The buttons can be attached to script actions, but there's no way to change the text on the button to describe its function. If you need a good Windows-based mainframe-terminal-emulation program, this is the one for you. Otherwise, you'll be much better off with one of the other programs we review.

BEST VALUE

TERMINAL PLUS 3.1 WITH FAXIT

Terminal Plus is an enhanced version of the Terminal utility included with every copy of Windows; it provides DynaComm-compatible scripting.

PROS: More file-transfer protocols than the Terminal utility included with Windows; optional fax support.

CONS: Limited support for Windows 3.1 features; slows down during background file transfers.

$195 ■ FutureSoft Engineering ■ 1001 S. Dairy Ashford, Suite 101, Houston, TX 77077 ■ (800) 989-8908, (713) 496-9400

Two versions of Terminal Plus are available; the base $99 package without fax support, and the $195 package that includes a copy of FutureSoft's Faxit for Windows. Terminal Plus is designed for casual communications users who need more power than the simple utility included in Windows provides but who don't need DynaComm's extensive LAN modem support.

■ **Feature Highlights** With only a few exceptions, Terminal Plus 3.1 is identical to FutureSoft's DynaComm in appearance and features. The major differences: Terminal Plus doesn't include DynaComm's support for shared modems over a LAN, and it lacks some of the terminal emulations found in DynaComm.

Terminal Plus is completely compatible with any settings files you've created for the Windows' Terminal utility. Its enhanced Terminal features include support for the Zmodem and CompuServe-B protocols, scripting, and dialing directories.

Unlike DynaComm, Terminal Plus is available with Faxit for Windows, FutureSoft's fax utility that works with a number of Class 1 and Class 2 fax-capable modems and fax boards. This makes it the only Windows communications program besides MicroPhone Pro to provide fax support. One nice feature of the Faxit module is the uninstall utility—during installation, Faxit puts some additional files in your Windows directories, and the uninstall utility ensures that they can be removed when no longer needed.

■ **Multitasking** While it was running in the background with the CPU-intensive spreadsheet running in the foreground, Terminal Plus experienced a slowdown of more than 3 seconds out of approximately 8.5 minutes for the file transfer. Otherwise, it worked the same as DynaComm. DDE support is also provided through scripts.

■ **Scripting** Terminal Plus 3.1 includes a Learn script for automating log-ons. It's compatible with all DynaComm for Windows scripts and includes all the same sample scripts. Scripts can be created and compiled through Terminal Plus and can be used with either the base or full program.

■ **Problems and Disadvantages** The only significant problem we found was Terminal Plus 3.1's slower performance when downloading in the background. Also some minor problems with its ANSI-BBS emulation caused it sometimes not to display some characters and other times to display them in the wrong colors. It's usually helpful to change fonts and occasionally clear the terminal screen. Terminal Plus 3.1 also has limited Windows 3.1 support.

UNICOM 3.1

The only shareware Windows communications program in this review, Unicom 3.1 is the least expensive, yet it has features that equal or surpass those of the commercial programs. It's the only Windows communications program that lets you install an external file-transfer protocol, so it can be used in virtually any situation.

PROS: External protocol support; drag-and-drop support under Windows 3.1; shareware (so you can try it before you buy it).

CONS: Occasional problems with dropped or incorrectly transmitted characters when running Unicom at high modem speeds; a 386DX or better system is strongly recommended.

$69.95 ■ Data Graphics ■ P.O. Box 58517, Renton, WA 98058 ■ (206) 432-1201

Unicom 3.1 is a bargain with only a $69.95 registration fee. It includes all the major file-transfer protocols and

even lets you add an external protocol driver for those it doesn't support. It has a powerful script language and highly customizable interface.

■ Feature Highlights Unicom 3.1 gives the user complete control over the appearance of the terminal screen. You can use the default icon bar or design your own; you can also define actions for all of the function keys and even redefine the actions of other "gray" keys, such as the arrow keys or Ins and Del keys. You also have the option of turning the icon bar or the function key template on or off.

If you're running Unicom under Windows 3.1, you can use the drag-and-drop feature with the Zmodem protocol to send files. You can also define an external file-transfer protocol driver if you need to use one that isn't built in. It's even possible to view GIF graphics files as you're downloading them. Unicom gives you better control over the 16550 UART (see "Tricks for Trouble-Free Communications," on page 197), and you can adjust the receive and transmit buffers to better match your system to the host. If you have an internal modem, you'll appreciate the optional status lights that give you the same information as the lights on most external modems.

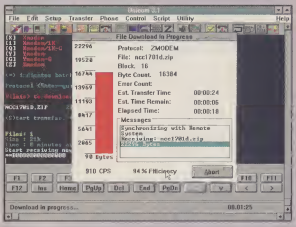
Another nice feature for those who use online services that charge a fee is the running-cost counter; just tell Unicom the hourly fee when you set up the dialing directory entry, and the status line will display a running approximation of the cost of the call.

■ Multitasking Unicom performed the same in the foreground and background during our CPU-intensive tests. When the program is minimized during a file transfer, the icon text displays the time remaining in the transfer. Version 3.1 includes full DDE support.

■ Scripting Unicom's script language is very powerful, though it may be too complex for the casual user to do more than just record keystrokes for automating future log-ons. You can create scripts with any ASCII text editor and run them from the menu or assign them to a function key. Unicom also includes a built-in scheduler that lets you set a date and time when a script will be automatically executed. This can be handy for such tasks as sending update files to a host.

■ Problems and Disadvantages Unicom's author strongly recommends that the program be run on a 386DX or better system. We encountered problems running Unicom at high modem speeds on a 486/33 system using the standard Windows communications driver: It would occasionally send incorrect characters to the host or lose characters sent from the host.

It can, in theory, handle modem speeds of up to 38,400 bps, but in all cases we had to set the modem speed to the connect speed to get it to work properly. We made



Unicom's terminal screen includes an icon bar and a button bar representing the function keys and other control keys. Unicom also provides the most complete file-transfer status window, with ample text and a vertical graph.

numerous unsuccessful attempts to contact Unicom's author. We were unable to solve the problem even though we consulted the manual and tried to adjust the communications parameters. Until it is resolved, we hesitate to recommend Unicom to high-speed-modem users. With that caveat, it gives you more for your money than any of these programs.

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That's right. You can actually restore a Mac file directly onto a PC, and vice versa.

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And nobody else comes close to our level of reliability.

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So they "scratched both disks with the point of a knife to simulate accidental damage" and found, to their astonishment, that Fastback Plus "was 100% successful at restoring all the [damaged] files."

Still unsatisfied, they "ran the test several more times, increasing the severity of damage until we began to fear for our disk drives, but we were unable to generate a single byte of unrecoverable data."

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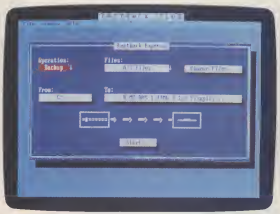


If automated, unattended backups aren't your style, you can still enjoy unprecedented convenience with our new Express Menu, which InfoWorld *considers "only slightly more complicated than an on/off switch."*

FIFTH GENERATION SYSTEMS, INC

Circle 268 on reader service card.

TECHNIQUES OF THE OS/2 MASTERS

EDITOR ED BOTT AND COLUMNIST JOHN DVORAK REVEAL THEIR BEST SECRETS FOR OPTIMIZING IBM'S POTENT OPERATING SYSTEM.

PHOTOGRAPH BY CHRIS HARTNOLL

LIKE ANY LEVEL-HEADED, intelligent power user, you have ignored the rantings of the pundits and put OS/2 2.0 to the test on your desktop or network. You've discovered that the object-oriented Workplace Shell is powerful, yet easy to use. Still, you don't have time to explore every folder and icon to fully exploit this 32-bit caged tiger. You're not alone. Even sophisticated OS/2 users find that it can take ages to unearth the best time-saving shortcuts and the most useful customizing techniques.

To help you use OS/2 more efficiently, we asked *PC/Computing's* editor Ed Bott and columnist John C. Dvorak, two OS/2 aficionados who have spent countless hours tweaking their OS/2 setups, for answers to some of your most frequently asked questions: What is the fastest way to navigate the Workplace Shell? How can I streamline the performance of my DOS and Windows sessions? Can I customize the desktop? And—for notebook use—can I survive without a mouse?

We weren't willing to settle for just any solutions, though—there are multiple ways to perform most functions in OS/2. We wanted Ed's and John's *favorite* tricks and techniques. It took some prodding, but they eventually gave in. Herewith, the best of the bunch.

Control Which Programs Launch at Boot-up

BY DEFAULT, OS/2 remembers which programs are running each time you shut down and restores that suite of programs (along with any programs located in the Startup folder) the next time you boot up. If you want to start with a clean desktop, follow these steps:

1. Restart your computer by cycling the power or pressing Ctrl-Alt-Del.
2. When the mouse pointer appears, press Ctrl-Shift-F1 and hold down this key combination until the desktop icons appear (this takes about 15 seconds). If your hard disk light stops flickering, your PC might be suspended. In that case, go back to Step 1.
3. Release the keys and then quickly press them again, holding them down until the desktop icons appear.

This procedure disables automatic reloading of applications only for the current session. To avoid automatic reloading every time you boot up and to further customize which programs are loaded at startup, we recommend updating CONFIG.SYS with the following statement:

```
SET RESTARTOBJECTS = STARTUPFOLDERSONLY REBOOTONLY
```

The parameter STARTUPFOLDERSONLY tells the system to launch only the objects in the Startup folder. REBOOTONLY starts the objects automatically only when the OS/2 shell crashes (or when the Shutdown command is not used) and the system is reset by pressing Ctrl-Alt-Del or cycling the power.

Pairing the two parameters means you'll have a clean desktop at the start of the day, but if OS/2 crashes at any point, you won't have to relaunch your most frequently used applications.

Disguise Folders as Menus

OS/2 ARRANGES objects within folders by spacing them horizontally according to their size. This works for large collections of files, but there's a cleaner, neater organizational option for small folders that contain only a few objects—the Drives or Command Prompts folders, for example. Point to the folder icon and open the pop-up menu by clicking the right mouse button, then click on Open, Settings to call up the Settings notebook. The first page is tabbed View. Select non-flowed, Normal size, and close the Settings window. All the objects in the folder are now displayed in a menulike array, with icons on the left and readable titles on the right.

TO QUICKLY READ AND ACCESS OBJECTS IN A SMALL FOLDER, DISPLAY THE OBJECTS IN MENU FORM AS SEEN IN THE COMMAND PROMPTS FOLDER ABOVE.

Fine-Tune Disk Performance

A CONTROVERSY RAGES among OS/2 users over the worth and effectiveness of the IBM High-Performance File System (HPFS) disk cache. After countless experiments, we've concluded that the ideal setting is 2,048K (assuming you have at least 8MB of memory). So the first line of your CONFIG.SYS should read:

```
IFS=C:\OS2\HPFS.IFS /CACHE:2048 /CRECL:4
  /AUTOCHECK:C
```

Further, if you've opted for OS/2's HPFS instead of the traditional File Allocation Table (FAT), then you don't need the secondary FAT cache and you can safely REM it out. Look in CONFIG.SYS for the line

```
DISKCACHE=64,LW
```

and change it to

```
REM DISKCACHE=64,LW
```

If you're using FAT instead of HPFS (perhaps to retain two-way file compatibility with earlier versions of OS/2 or DOS), increase the cache size to 1,024K and add the autocheck option to ensure that disk data is verified before the disk cache sends it to the hard disk. Edit CONFIG.SYS so that the DISKCACHE line reads:

```
DISKCACHE=1024,LW AC:C
```

You'll sleep better at night.

KILLER TIP: Disable the Win-OS/2 Clipboard for Better Performance

Sometimes maintaining a link between the OS/2 and Win-OS/2 clipboards can make a Windows application perform frustratingly slow. If you don't plan to cut and paste information between Windows and OS/2 applications, turn off the Win-OS/2 clipboard.

First, open the Settings menu by clicking on the Win-OS/2 program object with the right mouse button, and then clicking on Open, Settings. Then click on the Session tab, and press the Win-OS/2 Settings button. Scroll down to WIN_clipboard, and toggle the setting off. Close the notebook. The next time you start the associated Windows program, you should notice improved performance.

Bring UNDELETE Back to Life

OS/2 2.0 INCLUDES a powerful UNDELETE command for recovering erased files, but by default this command is disabled when you first install the operating system. To enable UNDELETE, load your OS/2 CONFIG.SYS file into the System Editor (or any plain-text editor) and delete the REM command at the beginning of the following statement:

```
REM SET DELDIR=
```

Specify a directory after the equal sign (the default is C:\DELETE) and reboot. To rescue an accidentally deleted file, open an OS/2 or DOS session and type UNDELETE *filespec*. Curious about which files are recoverable? Type UNDELETE /L to view a list.

Keep an OS/2 Window One Click Away

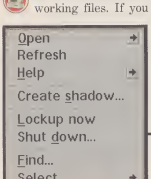
LIKE JUST about everything in OS/2, there are countless ways to open an OS/2 window. Here's the easiest one of all—add OS/2 Window as a choice on your Desktop pop-up menu. Here's how:

1. Display the Desktop pop-up menu by pointing to an open area on the desktop and clicking the right mouse button.
2. Click on the arrow to the right of Open.
3. Click on Settings, then click on the Menu tab.
4. From the Actions on menu choices, click on Create another.
5. In the Menu item name field, type OS/2 Window.
6. In the Program name field, type C:\OS2\CMD.EXE (if your OS/2 directory is on a drive other than C:, substitute the appropriate drive letter).
7. Click on OK or press Enter.
8. To close the notebook, just double-click on the title-bar icon.

The next time you display the Desktop pop-up menu, OS/2 Window will be among the choices. Click on it to run an OS/2 window.

Shut Down Without a Mouse

WHILE OS/2 is running, it maintains some large working files. If you shut down the computer without using the OS/2 Shut down command, you risk trashing these files. Permanent damage is rare, because OS/2 automatically fixes the files during its next boot-up, but it's annoying and time-consuming to watch CHKDSK at work. If you ever boot up OS/2 without a mouse, use a mouseless laptop, or your mouse conks out, you soon discover that you can't get to the menu that contains the Shut down command. (It's activated by pointing to the desktop and clicking the right mouse button.)

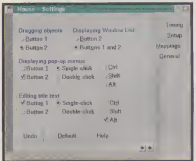


TO SHUT DOWN OS/2 FROM THE KEYBOARD, PRESS CTRL-\, SHIFT-F10, WHICH DISPLAYS THE SHUT DOWN COMMAND.

In fact, OS/2 *can* be shut down without a mouse. Here's how: First, pump through the sessions with Alt-Esc to get to the OS/2 desktop. (You can also hit Ctrl-Esc to display the session menus, choose the OS/2 desktop, and then press Esc to remove the menu and stay on the desktop.) Then press Ctrl-\ (backslash), which deselects every object on the desktop. (Don't press Ctrl-/ [slash]; that selects every object.) Next, press Shift-F10 and, bingo, up pops the Desktop menu. Type D to invoke the Shut down command. On your next boot-up, CHKDSK won't eat up time repairing the working files.

Remap Mouse Buttons to Your Liking

SOME PEOPLE (especially longtime Windows users) simply cannot adjust to the idea of using the right mouse button to drag objects around. No problem—you can remap the OS/2 mouse to meet all your needs. Find the Mouse icon in the System Set-up folder and open it. When you click on the Mappings tab, you can experiment with different mouse-click options. One caveat: If you map the left mouse button to both select and drag objects, you'll lose the ability to select a group of objects and drag them to another location. With these settings, all highlighting disappears as soon as you click the left mouse button.



THE MOUSE SETTINGS NOTEBOOK ASSIGNS FUNCTIONS TO THE MOUSE.

Replace Standard Icons Quickly

OS/2 FORCES you through too much rigmarole when replacing its boring standard icons. But you can find killer icons in the OS/2 forum on CompuServe (type GO IBMOS2 at a forum prompt). Or just download our batch OS2ICN.ZIP, from data library 3 (Utilities/Misc.) of PC/Contact, *PC/Computing*'s online service.

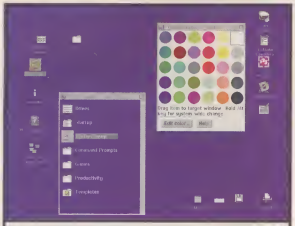
Open the drive where the new icons are stored (drive objects are usually minimized on the desktop), then open the folder that contains the icons and keep it open on the desktop. Now use the right mouse button to call up the Properties menu for the object whose icon you want to replace. Click on Open, Settings to reveal the Settings notebook. Next, click on the General tab to jump to the

icon-modification page. Now click on Find to open a new window. Click on Locate for a list of files or folders. The folder that contains the new icons will already be on the list. Click on the name of the folder and then click on OK. Now click on Find, and simply select an icon from the folder (they're all displayed). Click on OK to replace the old icon with the new one.

You can skip the initial step of opening the icon folder if you know the exact path and location of the new icon file and you're willing to type in the information manually. But it's much easier to open the folder and follow the steps outlined above. While the process sounds complicated, it's actually quick and painless.

Make Icon Text Readable

WHEN YOUR OS/2 wallpaper is a dark color, the black default text under each object is unreadable.



CHANGE THE COLOR OF THE TEXT AND LEAVE A DARK BACKGROUND INTACT BY USING THE COLOR PALETTE AND A SIMPLE DRAG-AND-DROP PROCEDURE.

Fortunately, you can change the color of this text globally within any one window by employing a simple trick: Open your System Setup folder (it's usually found under the OS/2 System icon), then open the Color Palette icon and click on the color you want for the icon text (try white for dark wallpaper). Hold down Ctrl, click the right mouse button, drag the color into the window (the mouse arrow should turn into a paint roller), and drop it onto any icon text. When you release the mouse button, the text in that window changes to the desired color.

Edit Icon Labels in Place

IF YOU'VE EVER used a Mac, you know how easy it is to edit the text under the icon. First-time OS/2 users may think they have to venture into the Settings folder to edit icon text. Not so. Simply select the icon (highlighting it, but not opening it) and press Shift-F9. (Dedicated mouse users can hold down the Alt key while left-clicking on the icon label.) Now the icon text can be edited in place. To save your editing changes, point to a

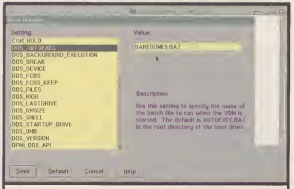
TO EDIT ICON TEXT IN PLACE, SELECT THE ICON AND PRESS SHIFT-F9. YOU CAN CREATE A LABEL THAT IS UP TO THREE LINES LONG.

different object and click the left mouse button. Using the Workplace Shell, you can create labels up to three lines long by simply inserting carriage returns.

Customize Each DOS Session

EAT YOUR HEARTS OUT, Windows users! With OS/2's virtual DOS machines (VDMs), you can customize each individual DOS session running under OS/2. You can run special versions of AUTOEXEC.BAT, load distinct sets of device drivers, and even run alternate command processors in side-by-side VDMs.

The place to work this magic is in the Settings notebook for each session. Point to the DOS object and click with the right mouse button, then click on Open, Settings. Select the notebook tab marked Session, and click on the button marked DOS Settings. Each of the settings on the left side of the window screen is fully configurable using the parameters box on the right side. Select DOS_AUTOEXEC to specify an alternate startup file for that session (it doesn't have to be called AUTOEXEC.BAT, either). Use DOS_DEVICE to load one or more device drivers into that VDM, or to define a new command processor (Norton's NDOS or JP Software's 4DOS, for example) with the DOS_SHELL setting.



TO RUN A MADE-TO-ORDER DOS SESSION, NAME AN ALTERNATIVE STARTUP FILE IN THE DOS SETTINGS NOTEBOOK.

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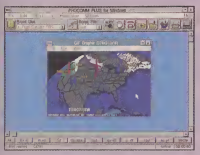

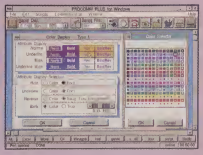

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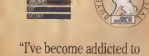

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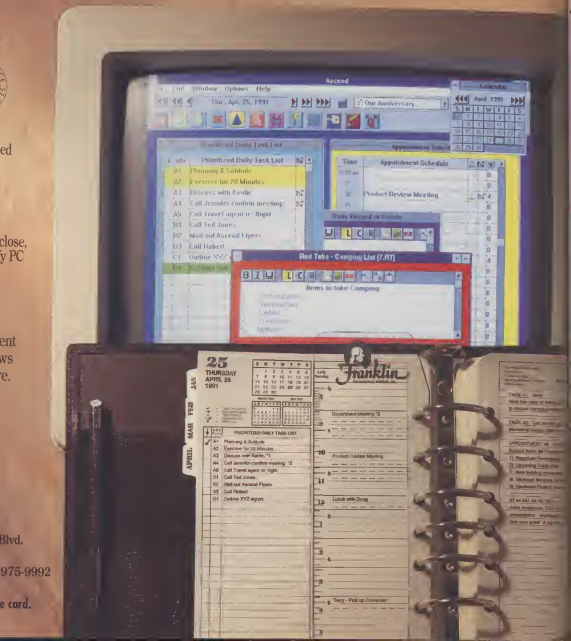
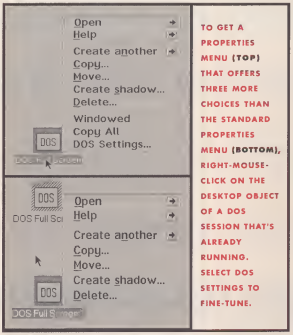


Adjust DOS Settings on the Fly

YOU CAN MODIFY a select group of DOS settings in the middle of a DOS session. Click the right mouse button on the DOS program object on the desktop to get three additions to the normal Properties menu.



TO GET A PROPERTIES MENU (TOP) THAT OFFERS THREE MORE CHOICES THAN THE STANDARD PROPERTIES MENU (BOTTOM), RIGHT-MOUSE-CLICK ON THE DESKTOP OBJECT OF A DOS SESSION THAT'S ALREADY RUNNING. SELECT DOS SETTINGS TO FINE-TUNE.

Click on the DOS Settings menu choice, and you'll gain access to about a third of the settings available from the program object's Properties notebook. This is a good way to experiment with settings to squeeze maximum performance out of a DOS application under OS/2.

Smooth DOS Communications Sessions

IF YOU RUN multiple DOS sessions under OS/2, you'll discover that the performance of some sessions may suffer unless you've fine-tuned the DOS settings to match the individual DOS program's temperament. The defaults work fine for most apps, but not for telecommunications programs. These programs like to have high priority, especially when receiving data in the background at 14.4 kilobits per second over the serial port. Here are the optimal settings for a DOS telecommunications package under OS/2:

- Set COM_HOLD to On.
- Double-check to make sure DOS_BACKGROUND_EXECUTION is set to On.
- Set IDLE_SECONDS to 4.
- Set IDLE_SENSITIVITY to 100.

(To open the DOS Settings page, right-click on the program object to bring up the Properties menu, click on Open, Settings, then click on the Session tab and on the DOS Settings button.) Be sure to leave all other DOS settings at their defaults!

Peel Off Multiple DOS Sessions

OS/2 2.0 LETS YOU RUN as many VDMs as you can squeeze into your system's RAM. To open multiple VDMs in a flash: Open the Command Prompts folder (found in the OS/2 System folder), point to the DOS Full Screen icon, and click on the right mouse button to pop up the Settings menu. Click on Open, Settings, and then click on the page tab General. Check the option box marked Template. The DOS Full Screen icon changes to one that looks like a notepad. Double-click on the upper-left corner of the Settings box to close it. Opening multiple DOS sessions is now a simple matter of "peeling off" pages from the DOS icon and dragging them with the right mouse button onto the desktop.

Zap the VDM Header

ARE YOU SICK of the strange header bar at the top of each full-screen DOS session? Simply type HELP OFF at the command prompt, and it's gone. To make the change permanent, add HELP OFF to the beginning of the custom AUTOEXEC.BAT file for any VDM.

KILLER TIP: Kick Back with Keyboard Shortcuts

OS/2's Workplace Shell demands a lot of mouse action, which is bad news for anyone who prefers a more relaxed working style—say, keyboard on the lap and feet on the desk. Here are some keyboard shortcuts you should know. Many will be familiar to Windows users; that's no surprise, since both Windows and OS/2 share some common ancestors, including IBM's Common User Access guidelines, which defined the look and feel of GUI sessions. *Note:* Some key combinations may have different functions in certain OS/2 applications.

Alt-Esc	Switch between program sessions.
Alt-Home	Switch DOS session between full-screen and windowed modes.
Alt-Tab	Scan through open windows in Workplace Shell.
Alt-F4	Close on OS/2 window opened from the Workplace Shell.
Alt-F5	Restore a maximized application to a window.
Alt-F7	Move an OS/2 window with the cursor keys.
Alt-F8	Size an OS/2 window opened from the Workplace Shell.
Alt-F9	Minimize a window.
Alt-F10	Maximize a window.
Alt-F11	Hide on OS/2 window (makes the window invisible on the desktop).
Ctrl-Esc	Go to desktop and bring up the window list.

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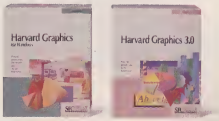

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CONSULTANT'S NOTEBOOK

10 EXPERT TIPS FOR BUYING THE RIGHT NETWORK SERVER

YOUR WHOLE NETWORK RELIES ON ONE PC—THE FILE SERVER. CHOOSE WISELY WITH THE HELP OF THIS NO-NONSENSE GUIDE.

AN ORDINARY PC WON'T DO FOR A FILE SERVER; it has to be specifically designed to handle the job. It has to balance performance, capacity, reliability, and compatibility.

There's a lot you should know: Is it really important to buy an EISA or Micro Channel architecture (MCA) bus machine, or can you get by with an AT-bus (ISA) classic? Is there such a thing as too much RAM? What file server configuration can keep your network running even when a disk drive crashes? Are there situations in which you can get better performance from less expensive hardware? Does it matter which vendor you buy the server from?

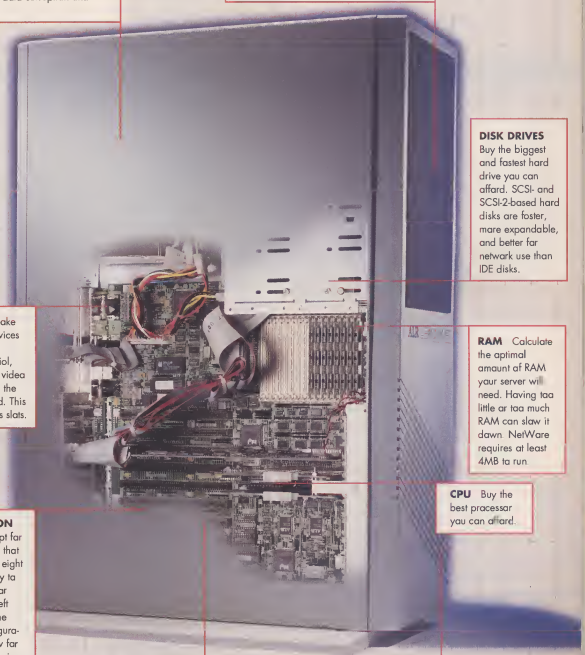
To help you purchase the ideal file server, we've outlined ten crucial steps to take before making your decision. We're assuming you're buying a server for a Novell-based network of about 25 users. So read on. You'll find that buying the brains of a network can be easier than you thought.

BY WILLIAM BEEM

PHOTOGRAPHS BY DAVIDO UNANUE. ILLUSTRATION BY TIMOTHY EDWARD DAVIS

POWER SUPPLY Check that the power supply is at least 300 watts. Skimping on power can cause data corruption and server crashes.

DRIVE BAYS Tower units generally offer more expansion room. Look for one with five drive bays so that you can add more hard disks later.



DISK DRIVES Buy the biggest and fastest hard drive you can afford. SCSI- and SCSI-2-based hard disks are faster, more expandable, and better for network use than IDE disks.

PORTS Make sure that devices such as the parallel, serial, mouse, and video ports are on the motherboard. This design saves slots.

RAM Calculate the optimal amount of RAM your server will need. Having too little or too much RAM can slow it down. NetWare requires at least 4MB to run.

CPU Buy the best processor you can afford.

EXPANSION SLOTS Opt for a file server that has at least eight slots, and try to have three or more slots left over after the initial configuration to allow for future expansion.

CONSTRUCTION Look for a sturdy machine that has plenty of ventilation slots. Without them, the server could overheat.

BUS If your network has more than 12 concurrent users, look for a 32-bit EISA or MCA bus machine to avoid data bottlenecks. Smaller networks can get by with an ISA-based machine.

THE PERFECT SERVER

1 BOOST NETWORK PERFORMANCE WITH A SCSI HARD DRIVE

The most important element in a file server—and maybe in a network—is the hard disk subsystem. A speedy hard disk subsystem improves network performance significantly. When choosing one, you first have to decide what kind of drive interface to use. Two are in common use today: integrated drive electronics (IDE) and small computer systems interface (SCSI). Both embed the drive controller in the drive.

- **IDE drives** offer a relatively large capacity (roughly 200MB to 500MB) for a low price. For DOS users, IDE drive performance is comparable to that of SCSI drives. But IDE drives are not as well suited for networks as SCSI drives are. That's because DOS is a single-threaded operating system: It must complete one command before processing a second. NetWare, however, is a multithreaded operating system, capable of issuing commands to hardware while other commands are still being processed. Since IDE drives do not provide a queue for holding commands, they cannot take advantage of NetWare's multithreading capability. Furthermore, you can put only two IDE drives on a system, severely limiting the server's expandability.
- **SCSI-based hard disks** are faster, more expandable, and better for network use than IDE drives. They are also more expensive. Each SCSI host adapter can service up to seven devices, which provides plenty of room for expansion.

Even better is SCSI-2, which offers greater compatibility and faster I/O than earlier versions of the SCSI standard, as well as a 32-bit data path. SCSI-2 also has a tagged and queued input/output capability. This allows for multithreading, which makes for a far more efficient hard disk. It works like this: NetWare sends multiple commands to a SCSI-2 controller, which routes those commands to the appropriate drives. The electronics in the drives can perform those commands in any order and can hold a queue of commands for the drive. Multiple threads continue processing in NetWare without waiting for the hardware device to process individual commands. For instance, NetWare can send a read command to a drive while the drive is still processing an earlier read command. The SCSI-2 drive performs the queued commands in the most efficient order. Depending upon the location of the drive head when a command arrives in the queue, the third command in line may be processed and returned before the first one.

Some SCSI-2 adapters are sold with a read-ahead cache, but you should avoid using this cache in NetWare file servers because NetWare already provides caching software; mixing two caches will probably slow down your drive. In addition, caching controllers often cost more than regular controllers and provide slower access time than NetWare's software cache. It's best to avoid caching controllers altogether—at least disable the SCSI disk's cache if the drive comes with one.

2 YOU NEVER HAVE TOO MUCH DISK SPACE

There's one thing to remember when you buy a hard disk for a network file server: No matter what you buy, it will never be big enough or fast enough. Applications and data files tend to expand to fill any *volume* (a logical unit of storage on a network). In addition, drives are always the slowest component in any computer system. So buy the biggest, and fastest drive you can afford.

To know how large a hard disk your server should have, you need to calculate storage needs for the following: the operating system, user data, common applications, shared data files, and empty work space.

First, the NetWare operating system takes up room. The initial bootup partition for NetWare 3.11 has to be formatted as a DOS partition of about 2MB. Most of NetWare is loaded into the PUBLIC and SYSTEM directories and takes up roughly 17MB of storage. Be conservative and allow 20MB for the operating system.

The amount of storage space network users need can be difficult to measure, because different users have different requirements. A good rule of thumb is to allot 30MB per user. While 30MB might not seem like much, keep in mind that this is just for data. Most of the applications will be stored in another section of the server.

Shared applications, such as network versions of word processors, databases, graphics programs, and spreadsheets, take up a good chunk of the drive. Of course, the amount of space required depends on the specific applications you will load onto the server. A good rule of thumb is to allow 10MB for each DOS app and double that number for any Windows or graphical software.

Deciding how much space you need for shared data files is a little trickier. If you store a lot of graphics files, fax images, or sound files, be prepared: They chew up lots of disk space. There's no guideline for estimating how much space these files will need—except to get much more than you think you'll need.

By contrast, most spreadsheets, even large ones, take up minimal space. Storage needs for databases, however, can range from minute to Matterhorn-size. One way to gauge the storage requirements of a database is to determine the size of an individual record, then multiply it by the estimated total number of records. Next, add about 20 percent for file slack due to allocation-table inefficiencies. Double the total to account for growth.

Keep in mind that most networked applications need room to work. Apps from word processors to databases use temporary files; they won't be able to perform some functions and might even crash if they can't find room to write these files. A guideline for estimating work space is that it will take up one fifth of your drive. So, for example, if you've estimated that your server needs 400MB for the operating system, user data, common apps, and shared data files, you'll need to add 100MB of work space—which adds up to a 500MB hard disk.

3 PINPOINT THE RAM YOU NEED

NetWare requires at least 4MB of RAM, but that's not always enough. NetWare requires a certain amount of memory to boot up; once it uses that memory, it puts whatever doesn't fit—including directory and file allocation table (FAT) data—into its cache.

RAM requirements are determined by the size of the network's volumes, the size of each volume's *block* (a unit of data stored on a disk), the number of directories in the FAT, and the number of users accessing the server. OS/2 workstations, which require added space for long names, take up more RAM than DOS volumes. Smaller blocks take up more RAM than larger ones.

Use the following formula to determine how much memory your file server needs for each DOS volume:

```
Memory = 0.023 * volume size (in MB) / block
  size (default is 4K)
```

Checklist for the Perfect Server

A 486 Gives Your Network Room to Grow ..... ✔

You'll need at least a 386 chip, and preferably a high-powered 486 chip, if you want to plan for the growth of your network. (NetWare 3.11 requires at least a 386.) Since the operating system isn't processor intensive, even a 386/16 will suffice for a stock installation. But some NetWare Loadable Modules (NLMs), such as Novell's SQL Engine, might require a heavy-duty processor. So even if you don't need to install any NLMs right away, get a fast CPU, such as a 486/33, or perhaps an upgradable system.

Too Much or Too Little RAM Degrades Performance ..... ✔

Having too much or too little RAM can hurt your server's performance. Use the following formula to determine exactly how much memory your file server needs for each DOS volume:

```
Memory Required = 0.023 * volume size (in MB) / block size (default is 4K)
```

Add the RAM requirements for all volumes in the server, then add 2MB for the operating system itself. Round the total up to the next highest megabyte. NetWare needs at least 4MB, so buy that much even if your total is lower.

A Big, Fast SCSI Drive Moves Data Faster ..... ✔

Choose the biggest and fastest hard drive you can afford. Make sure you get a SCSI drive and controller to take advantage of NetWare's multithreading command capabilities. An even better bet is SCSI-2, which offers greater compatibility than earlier versions of SCSI as well as other benefits. Avoid any adapter with a read-ahead cache, which can slow down your system, or with a write-delay cache, which can corrupt data. If you can't avoid them altogether, at least disable the SCSI drive's cache on installation.

Go with a Wide Bus to Avoid Bottlenecks ..... ✔

Buy an MCA- or an EISA-based system unless you have a network of fewer than a dozen users. With fewer than 12, you can make do with an ISA bus, but with more than that, you'll run into bottlenecks on your server. Also, ISA buses offer little room for expansion. Both MCA and EISA systems take full advantage of bus mastering, which allows adapters to control the bus without interrupting the CPU. This can boost performance for servers with heavy traffic or many NLMs.

A Well-Built Motherboard Means Fewer Headaches ..... ✔

Verify that all solder connections are uniform and clear. Be wary of solder connections of different sizes and with dingy gray marks. Note the location of any jumper pins, cables, or connecting points, then check whether the documentation has a map of the motherboard with an explanation for each of these items. If the documentation isn't clear, you may run into problems when troubleshooting. Make sure that internal components, such as RAM and CPU modules and the power supply, don't impede your access to the server's slots.

300 Watts or More Prevents Overheating ..... ✔

Make sure the power supply is 300 watts or greater. At the very least, make sure your file server is plugged into a surge protector. An uninterruptible power supply (UPS) is also a wise buy. A 15-minute UPS will prevent crashes and give you time to safely shut down the server.

Novell Certification Is Good Insurance ..... ✔

Make sure the server is certified by Novell, which means that Novell has tested it and said it will work with Novell networks. Most certified file servers and components have device drivers written specifically for them, and it's usually easier to get help if the product has the Novell stamp of approval.

Use this formula for each volume that requires space for long names:

```
Memory = 0.032 * volume size (in MB) / block
  size (default is 4K)
```

Add the RAM requirements for all volumes in the server, and then add 2MB for the operating system itself. Round the total up to the next highest megabyte. Remember, the server needs a minimum of 4MB, so plan for that much even if you calculate a lower number.

For example, a system with a 500MB drive configured with 4K blocks would look like this:

```
Memory = 0.023 * 500 / 4 = 2.88MB
```

The requirements rounded up to the next megabyte would be 3MB. Next, add 2MB for the system. The total for the server is 5MB.

Your server will suffer a performance hit if it doesn't have enough RAM, but don't forget that too much RAM can be problematic, also. That's because of NetWare's software cache. The operation of a disk cache is fairly simple: The cache software tries to anticipate which data you will need and have it available in RAM when you need it; since RAM access is much faster than disk access, performance improves greatly. However, there's a catch. Too much RAM means a large cache. Too large a cache can actually hinder performance by wasting time to search RAM before turning to the disk for the data. To find out how much RAM you need, use the formula.

4 STRETCH YOUR BUDGET TO BUY A FAST PROCESSOR

You may be surprised to learn that a blazingly fast CPU doesn't have much effect on data throughput on your network. Once you get past a 386/16 chip, the CPU is no longer a limiting factor for simple file server operations. If you know that the file server is going to run only the stock version of NetWare, a 20MHz 386 machine should theoretically suffice.

But if the server is going to be loaded with NetWare Loadable Modules (NLMs), such as Novell's Btrieve or SQL Engine, your processor choice becomes more critical. A good rule of thumb is to buy the best processor you can afford. Even if you don't use all of its capability at first, you'll have room to expand.

Considering today's low prices and the insignificant price differences between 386 and 486 PCs, it's almost foolish not to get a 486SX or better CPU to accommodate future needs. NetWare 3.11 requires at least a 386, and there's a good chance you'll want an EISA or MCA bus machine with a 32-bit data path, as explained below.

5 AVOID TRAFFIC—TAKE A 32-BIT BUS

You have a choice of three bus types: ISA, EISA, or MCA. In general, networks of fewer than a dozen concurrent users should be able to get by with an ISA-based machine. But if your network exceeds that limit, you should use an EISA- or MCA-based server.

- **The ISA bus** transfers data between expansion boards at a maximum speed of 16 megabits per second (Mbps), and each data transfer takes two cycles of the bus clock. Operating at a standard bus clock speed of 8MHz, the ISA bus tops out at 64 Mbps. (Maximum throughput is calculated by multiplying the transfer rate by the clock speed, then dividing the result by the number of clock cycles required to transfer data. In the ISA example, 16 * 8 / 2 = 64 Mbps.) Some ISA bus machines operate at slightly different speeds—up to 10MHz—but the performance difference is negligible.

Once a network expands beyond 12 users, the workload exceeds the ISA bus's capacity, and you get a data bottleneck. Since EISA and MCA 32-bit bus designs have a higher data-transfer threshold, they leave ISA in the dust on larger networks.

- **The EISA bus** operates at 8MHz to retain backward compatibility with the old ISA bus, but fortunately it offers two performance enhancements over ISA. First, EISA doubles the bus width from 16 to 32 bits. This doubles the potential transfer rate from 64 Mbps to 128 Mbps. The second enhancement changes the operating mode to allow data transfers to finish in one clock cycle instead of two. This doubles the maximum transfer rate again, from 128 Mbps to 256 Mbps, a significant advantage over the ISA bus machine.
- **The MCA bus** is the speediest—in theory. Originally, MCA operated at 10MHz with a 32-bit data path and two clock cycles per transfer. The top speed was 160 Mbps. But IBM has refined the MCA bus since its introduction, and using a number of new techniques, it can now potentially operate faster than the EISA bus. In practice, however, it operates at the same speed as EISA because card vendors haven't taken advantage of all the benefits of MCA.

EISA and MCA servers have another advantage over ISA servers: ease of configuration. Both have an automated setup feature that makes it easy to change the configuration and spot interrupt conflicts. In EISA systems, the automated setup feature works only with EISA adapters. To set up an ISA adapter in an EISA system, you still have to flip dip switches and move jumpers. MCA boards don't have dip switches or jumpers (with a few rare exceptions), but you can't use ISA boards in MCA systems.

ISA, EISA, and MCA all implement *bus mastering*, a technology that relieves the CPU of the responsibility of coordinating access to the system bus. Each bus-mastering network card attached to the server can access the system bus on its own. A busy system needs the expanded bus width offered by EISA and MCA to take advantage of bus mastering. However, you probably don't need a bus master unless you're running server-based applications that use the CPU or you have installed more than one network interface card.

6 CHECK THE SERVER FOR QUALITY DESIGN AND ACCURATE DOCUMENTATION

Once you know the technical specifications for the server, you'll want to make sure that the machine you buy has top-notch construction. Evaluating quality isn't tough. Start with the case. Look for a sturdy one with ventilation slots. Without these, the server can overheat and crash.

Inside the case, check the quality of the motherboard. Verify that all of the solder connections are uniform and clear. Be wary of solder connections of different sizes and with dingy gray marks.

While looking at the motherboard, watch out for stupid design flaws, such as the one we discovered on a Zeos server. The CPU blocks the first four expansion slots, and the RAM SIMMs cause serious trouble: To plug in a full-length card, we had to jam it in between the SIMMs. The moral: Make sure that all of the pieces fit neatly together and don't interfere with each other.

Next, assess the documentation. Note the location of any jumper pins, cables, and connecting points, then check the manual for a map of the motherboard with an explanation of each of these items. If it's hard to find information in the documentation now, think how difficult it would be if you were configuring the server late at night knowing it had to be up and running early the next morning. If the documentation is poor, the phone support probably won't be much better, since that's where technical-support staff get their answers.

Finally, check the power supply. It should be at least 300 watts. Skimping on power can cause data corruption and server crashes. The power supply should have an Underwriters Laboratories stamp on it to certify that it passed safety tests.

7 FIND A TOWER WITH PLENTY OF SLOTS AND BAYS

Your server is going to have to grow to keep pace with your expanding network. Computers with three slots and one drive might meet your needs today, but you won't be able to add more network interface cards or hard drives. Servers with eight slots have become standard, so opt for one of that size. Try to have three or more slots left after the initial configuration; as the network grows, you might need to add another network interface card to divide server traffic or to connect with another network. Peripherals, such as additional drives or CD-ROM jukeboxes, also take up slots. If you're buying an EISA machine, make sure that every slot is an EISA slot.

Stick with tower units, which generally have more room for expansion. Get a unit with five drive bays so that you can add internal hard disks if you need to, but don't hold out if a server has everything else you want. Although internal disk drives are less expensive, many network administrators prefer external drives. Adding or replacing an external drive is a cinch, and they don't drain the server's power supply.

If you're going to connect printers to your file server, check to see how many device ports come with the unit. Most servers come with at least one parallel port and one serial port. If you need to support more than two printers, you may have to sacrifice a slot for a port-expansion card.

Tips for Peak Performance

Once you buy the ideal file server and install it, you'll want it to operate at peak efficiency. Follow these tips to achieve maximum power and minimum hassle.

Save on Hard Disk Space

Lack of storage space may be the most frequent problem you encounter with your server, but there's a simple way to save on hard disk space. First, delete all unnecessary sample files from your programs; this can save as much as 6MB per application. Second, make sure that applications used only by individuals and not shared over the network are stored on local hard drives, not on the server.

Split Up Overactive Workstations

It's possible for a few overactive workstations to severely degrade the performance of your entire network by flooding your network lines with data. An average 386SX workstation functioning at full tilt can transfer data at roughly 1 megabit per second. A dozen workstations doing likewise could bring an ethernet line to its knees.

If a couple of heavy hitters cause a throughput problem, add another network card to the server and attach a new ethernet data line to the card. Then divide the heavy users between the different lines.

Obtain the Latest Drivers

To move data from the server's network interface card to the server's bus, you need a device driver. A poorly written device driver can impair even the fastest hardware, so always make sure you have the latest release of the device drivers for your peripherals and LAN adapters—and call in regularly for updates. Poorly written drivers may also fail to recognize more than 16MB of RAM or may not coexist easily with other drivers. Although not all of these drivers are free, they are generally worth the cost.

8 ENSURE DATA INTEGRITY WITH A DISK ARRAY

The most valuable part of your network—and possibly your business—is the data stored on your server. When buying a server, you can take a number of steps to make sure that your data remains safe in just about any circumstance.

Redundant array of inexpensive disks, or RAID, is a technology you can use to avoid data loss due to drive failure. It provides different levels of fault tolerance based on server configuration. The easiest way to implement RAID is to buy two hard disks that mirror each other. *Disk mirroring* writes your data to identical drives attached to the same controller. The disks operate concurrently, each storing and updating the same files. If one drive fails, the server can still work on the other without interruption.

Disk mirroring, however, is not perfect. Since mirroring duplicates disks on the same channel, it doesn't guard against failures along the channel between the disks and the file server. Such failures affect both disks and can cause them to fail.

To guard against this type of failure, get a file server that offers *disk duplexing*. Disk duplexing uses mirrored disks that each have a separate controller card. Data is still written identically to both drives, but you have the added protection of an additional controller in case one malfunctions.

Duplexing also offers *split seeks*, which improve performance. This feature sends read requests to whichever disk in the pair can respond first. Multiple read requests can be split between the duplexed disks for concurrent processing and faster file access.

If you store mission-critical data on your server, you'll need to implement a higher level of RAID technology. These higher levels use *disk-striping* (which distributes your data across multiple drives) and error-checking techniques to protect data.

9 BUY TWO SERVERS

Disk mirroring and duplexing are redundancy techniques that help protect data and keep the server operational in the event of failure. Unfortunately, NetWare doesn't yet offer redundancy for other server components. Version 4.0, due out sometime this year, is supposed to include System Fault Tolerance III, which will include complete server mirroring. (SFT III is in limited release in NetWare 3.11.) It works on the same principle as disk duplexing, except that the server's functions are duplicated and operate concurrently. If one file server goes down, the other will keep working.

That doesn't mean you should wait for NetWare 4.0 before buying a duplicate file server. Even though it can't run concurrently under NetWare 3.11, a duplicate file server is excellent insurance against lengthy downtime. If a system board fails, a duplicate can be used to get the network running again.

A duplicate file server should be configured exactly like the original. Buy the same model with identical drive and RAM configurations, network interface card, and other peripherals. Install NetWare in it so that it's ready to run when it's called into action. All you'll need to do is plug it in and restore your current backup.

Of course, an extra file server means more money. If you use your network primarily to run e-mail and simple shared apps such as word processors, an extra server might not be worth the expense. But if you run critical apps on your network, a backup server is essential.

10 PURCHASE A CERTIFIED SERVER FROM A VENDOR YOU TRUST

The final, and in some ways most important, step in buying a file server is choosing a reliable source. At an absolute minimum, make sure that the server is certified by Novell, which means that Novell has tested it and determined that it will work properly with Novell networks. Most certified file servers and components have device drivers written specifically for them. Of course, the chief benefit of certification is that if a problem arises with a Novell-certified hardware component, the company takes the problem much more seriously.

Even if Novell certifies a server, plenty of things can still cause a glitch when you put a file server together. Just because all of your components are individually certified doesn't mean they'll work together. It's important to find a vendor that's willing and able to support the equipment. A good dealer provides onsite service.

Choose a dealer that specializes in networks and that has an onsite staff experienced in troubleshooting Novell networks. Also, look for a dealer that installs the operating system and supplies the most recent updates. Find out how quickly a vendor can respond to a service call. Most servers bought through direct mail have a next-day service agreement, but sometimes that's not good enough. IBM guarantees a four-hour response time. Some direct-mail vendors will work out similar agreements; the details should be spelled out in a contract.

A good dealer can also point out problems with your network configuration, such as a compatibility problem between hardware components. Dealers can also be a repository for information from multiple vendors; chasing down information, drivers, and code patches on your own can be time consuming.

Ask for references from customers. Talking to three or four customers can give you an impression of the vendor's strengths and weaknesses. Every vendor has some soft spots, so it's smart to know what they are before you place an order. ◪

William Beem was the PC support manager for SunTrust Service Corporation and is currently at work on Reengineering in the 1990s, *to be published by Ziff-Davis Press.*

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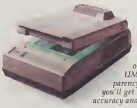

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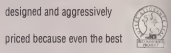

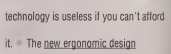

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Hard Drive	105MB	105MB	105MB	170MB	170MB	170MB	170MB
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1 2MB FDD	●	●	●	●	●	●	●
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Color SVGA Monitor (nonx-lap)	.39 dot pitch	.28 dot pitch	.28 dot pitch	.28 dot pitch	.28 dot pitch	.28 dot pitch	.28 dot pitch
2 Serial / 1 Parallel Ports	●	●	●	●	●	●	●
Upgradable Processor			●	●	●	●	●
200W Power Supply	●	●	●	●	●	●	●
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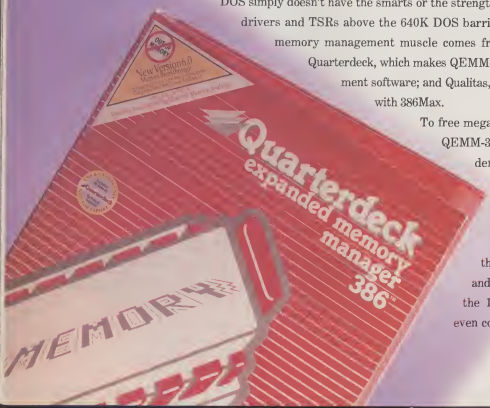
THE PC/COMPUTING
FACE-OFF:

QEMM-386 VS.

Top-selling QEMM-386 and its perennial rival 386Max both reclaim acres of memory for running applications faster. But kilobyte for kilobyte, which package is better? Our definitive comparison has the answer.

IF YOU HAVE A 386-BASED PC or better with at least 1MB of RAM, you're probably wasting hardware memory, even if you've already installed DOS's simple memory manager. Device drivers and memory-resident programs are hogging the first 640K of RAM, taking up space that you could use to run a large spreadsheet or to jump back and forth between Windows and WordPerfect for DOS. What will happen when you further burden conventional memory by installing a network or a CD-ROM drive? Your favorite DOS application may refuse to load entirely.

DOS simply doesn't have the smarts or the strength to cram all your system's device drivers and TSRs above the 640K DOS barrier and into upper memory. Real memory management muscle comes from two out-of-town contenders: Quarterdeck, which makes QEMM-386, the leading memory management software; and Qualitas, which is hot on Quarterdeck's tail with 386Max.



To free megabytes of RAM, both 386Max and QEMM-386 move drivers and memory-resident programs out of the 640K of conventional memory into upper memory. They also allow certain programs to access expanded memory (memory outside the CPU's normal address space) and extended memory (memory above the 1MB mark). The latest versions even convert empty areas in video RAM

386MAX

and ROM into holding places for drivers and the like, providing more room for applications. (For a fuller explanation of the kinds of memory, see "A Brief History of Memory" on page 230.)

QEMM-386 and 386Max have been playing catch-up with each other ever since the first 16MHz 386 PC introduced hardware capable of advanced memory management. Quarterdeck's QEMM-386, the original memory manager, was initially marketed as a "hypervisor" that made the windowing environment Desqview a more practical DOS multitasker. Qualitas nimbly followed by touting 386Max as *the* memory management package for Desqview. In this competitive climate, both programs evolved into powerful tools for anyone who wanted to squeeze out the last drop of coveted RAM.

In their latest iterations, QEMM-386 and 386Max boast improved memory management prowess and ease of use. For example, you once had to load programs into high memory manually; now QEMM-386's Optimize and 386Max's Maximize do the chore automatically. In addition, both insulate you better from complex terms and techniques—though you can certainly get your hands dirty if you want.

Both programs offer similar features and a wide variety of options, and both are downright hospitable. But no two products are completely alike—as large numbers of users swear by one package and scorn the other. To determine conclusively which memory manager is tops, we tested the latest versions of both in ten categories and gave them a workout in the *PC/Computing* Usability Test Center (see page 232 for the results). What we found were two closely matched memory managers with some significant differences.

THE CONTENDERS

386MAX 6.02, $99.95
Qualitas ■ 7101 Wisconsin Ave., Suite 1386, Bethesda, MD 20814 ■ (301) 907-6700

QEMM-386 6.02, $99.95
Quarterdeck Office Systems ■ 150 Pico Blvd., Santa Monica, CA 90405 ■ (310) 392-9851

PHOTOGRAPHS BY REID STINSON

BY DAN GOOKIN

EASE OF INSTALLATION

THERE'S NO SENSE in ripping off the shrink-wrap and shoving the disk in your drive if you have to wade through two chapters just to install the program. No worries, both QEMM-386 and 386Max pass the ease-of-installation test with high marks—no manual required.

But, if you do rely on the documentation, you'll find the two programs unequal. The 386Max manual places the installation instructions up front in chapter 1. While the QEMM-386 manual doesn't broach the subject until chapter 2, it does offer suggestions for several PC configurations—including laptops that have a sleep mode.

The installation of each package proceeds smoothly once underway. In our usability tests, users took less time and fewer steps to install QEMM-386, but we found the difference to be negligible and actually preferred 386Max's informative screen displays.

VERDICT EASE OF INSTALLATION

386Max has the slight edge for its straightforward manual and more informative screen display.

WINNER 386MAX

THE "BLOAT FACTOR"

THE ONLY REMINDER that 386Max and QEMM-386 are installed on your system is what we call the *bloat factor*: the increase in the size of your CONFIG.SYS and AUTOEXEC.BAT files due to the presence of memory management commands.

386Max swells up CONFIG.SYS more than QEMM-386 does. On our test systems, 386Max increased the size (in bytes) of AUTOEXEC.BAT and CONFIG.SYS by an average of 136 percent; QEMM-386 expanded them by 111 percent. However, both insert long pathnames and options before device drivers and TSRs. QEMM-386 offers a "quieter" boot-up screen than 386Max does; 386Max's 386LOAD programs clutter the screen with two lines of copyright and other information each time they're run. The one advantage 386Max has is that many of its options and switches are stored in a convenient "profile" on disk, as opposed to being appended to the driver commands in CONFIG.SYS. QEMM-386 takes the latter approach, which often makes its device driver command long and complex.

VERDICT THE "BLOAT FACTOR"

In both programs, you'll notice the bloat factor only when you edit CONFIG.SYS and AUTOEXEC.BAT. Even then, you can easily work around the long command lines. This one's dead even.

WINNER TIE

A Brief History of Memory

TEN YEARS AGO, MEMORY management wasn't an issue because there was so little memory in the microcomputer. Then IBM introduced its PC, which sported a 16-bit microprocessor. It could access a full megabyte of RAM, or 1,024K—an incredible amount of memory at the time.

IBM split the 1,024K of RAM into two chunks. Conventional memory was set aside for running programs. Reserved memory (what we now call *upper memory*) contained the video buffer, the ROM BIOS, and plenty of room for expansion. Conventional memory occupied the bottom 640K, and reserved memory took up the remaining 384K. It seemed like an ideal setup, since 640K was ten times the amount of RAM in microcomputers of the day.

Three years after the PC's introduction, 640K proved to be insufficient. This reflects a basic law of available disk space—data and applications increase to fill the amount of space available. The way PC programs were designed, they tended to hog the full 640K of memory. And memory-resident programs became very popular, fueling a demand for more memory.

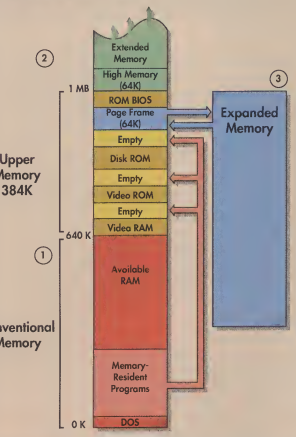
THE EXPANDED MEMORY SOLUTION

The first to experience severe RAM drought were Lotus 1-2-3 users who worked with large spreadsheets. So Lotus, Intel, and Microsoft devised a solution called Lotus-Intel-Microsoft Expanded Memory Specification (LIM EMS). EMS includes an expansion card that's packed with RAM and installed in the PC, and a software Expanded Memory Manager (EMM) that provides the routines for accessing the extra memory.

Think of expanded memory as a refrigerator full of RAM chips. While the refrigerator can hold megabytes, DOS's table can hold only 640K of RAM chips. You can access the expanded memory by filling a dish with RAM chips and setting it down on a clear space on the table. Expanded memory is accessed this way, one dish at a time.

This metaphorical dish is actually set up by the expanded memory manager as a 64K chunk of memory called the page frame. Typically, the program creates the page frame in upper memory as four 16K *pages*, which

THE MEMORY MAP



1 Your PC's first megobyte of memory contains 640K of conventional RAM and 384K of *upper memory*. Conventional RAM normally holds programs such as device drivers and TSRs, any applications you're running, and DOS, while upper memory is reserved for video adapters and system ROM, and also includes some unused address space. To make room for running applications in conventional RAM, a memory manager converts the empty blocks in upper memory to RAM, and then moves your device drivers and TSRs into them.

2 *Extended memory* is RAM above the 1MB mark. With the help of the Extended Memory Specification, certain DOS programs such as RAM drives, disk caches, and print buffers can be stored in extended memory. In addition, on a 386-based PC, multitaskers like Windows in 386 Enhanced mode and Desqview 386 can run programs in extended memory.

3 *Expanded memory* lies outside the CPU's normal address space. To access it, a CPU places calls to a memory manager's software driver and maps four 16K pages of expanded memory into and out of a reserved location below 1MB known as the *page frame*. A program must be specifically written to use expanded memory. If you want to run programs that take advantage of expanded memory, you'll need a memory manager, which can usually simulate expanded memory by borrowing from extended memory.

are used to shuttle a 16K chunk of memory between expanded memory and conventional memory.

Eventually, the EMS was augmented to include a huge 384K page frame in conventional memory (LIM EMS was renamed LIM 4.0 EMS). This standard allowed for rapid swapping between conventional and expanded memory. But there was still a major drawback to expanded memory: It was large enough for storing data but too small to run programs in.

ENTER EXTENDED MEMORY

In 1984 IBM introduced the PC-AT, which contained a 286 microprocessor that could access up to 16MB of RAM. IBM began to refer to this extra memory in the PC-ATs as *extended memory*. Despite the similarity of the terms *expanded* and *extended*, the two types of memory are worlds apart.

Extended memory is memory above the 1MB mark. Any extra memory added to a 286 (or the 386 and its relatives) is always extended memory. To access extended memory, two standards were developed. The first standard is Microsoft's Extended Memory Specification (XMS), which controls extended memory used for storage. The second standard is the Virtual Control Program Interface (VCPI), developed by Quarterdeck, Phar Lap, and other companies. This standard covers only 386-family computers, which are far more adept at controlling memory than their predecessors. VCPI allows certain applications running under DOS to access extended memory and tap into the 32-bit glory of the 386.

LOADING HIGH

Still, these solutions and schemes fell short of increasing conventional memory. Users began to look enviously upon that 384K chunk of memory known as *upper memory*. Thanks to the memory management expertise of the 386-family microprocessors, empty regions of upper memory could be filled with usable RAM. These *upper memory blocks* (UMBs) could be used to hold small programs, such as device drivers and TSRs, that normally consumed conventional memory. The process of moving programs into upper memory is called *loading high*. The 386-family PCs can create UMBs and load device drivers high with the help of a memory manager.

REPORT CARD: HOW 386MAX AND QEMM-386 MEASURE UP

FEATURE	386MAX 6.02	QEMM-386 6.02
USABILITY	Assumes some knowledge of memory; has more flexibility and depth.	✔ Accomplishes the basics more easily; average time per task half that of 386Max.
EASE OF INSTALLATION	✔ Informative screens; straightforward manual.	Instructions hard to find in disorganized but detailed manual.
THE BLOAT FACTOR	✔ Crowds CONFIG.SYS with command lines; stores options in convenient on-disk profile.	✔ Uncluttered boot-up screen; stores options in driver that hangs off CONFIG.SYS, making its command line long and complex.
WINDOWS COMPATIBILITY	Fully compatible with Microsoft Windows 3.1 but offers no specific Windows utilities.	Fully compatible with Microsoft Windows 3.1 but offers no specific Windows utilities.
EASE OF CONFIGURING MEMORY	✔ Automatic loading of device drivers and TSRs; online help.	Automatic loading of device drivers and TSRs.
ROM SHADOWING	ROM search maps out various BIOS's in upper memory.	✔ Stealth maps out various BIOS's, finds more upper memory than ROM search.
LOADING HIGH	✔ Able to load device drivers and TSRs high; missed only one TSR in network server test.	Able to load device drivers and TSRs high; missed two TSRs in network server test.
VIDEO MEMORY TRICKS	The VIDMEM option is used after 386MAX.SYS is run to raise the 640K limit by 64K or 96K.	✔ VidRam, a standalone TSR, raises the 640K limit by 64K or 96K. It also monitors video activity and can be toggled on and off.
EASE OF UPDATING	✔ Easy to update CONFIG.SYS and AUTOEXEC.BAT; handy Max configuration editor helps you update memory management driver.	Easy to update CONFIG.SYS and AUTOEXEC.BAT; updating memory management driver requires finding options and switches in manual.
MEMORY REPORTING	ASQ includes tutorial on memory and online help.	✔ Manifest is a detailed and thorough system snoop.
UTILITIES AND TOOLS	✔ Disk cache and RAM disk driver; memory manager for 286 and 8086/8088 PCs; uninstall program.	✔ Command-line programs that store DOS resources in high memory; support for sleep mode in laptops; uninstall program.

✔ = WINNER

386MAX IS OVERALL CHAMP

386Max consistently outperformed QEMM-386 on the bread-and-butter task of freeing conventional memory. QEMM-386 was able to load device drivers and TSRs high but did not free up as much conventional memory.

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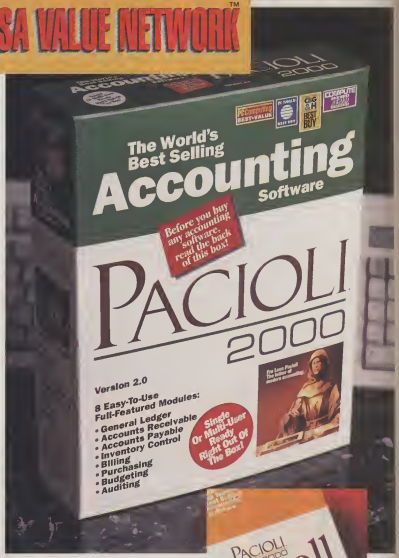

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WINDOWS COMPATIBILITY

BOTH 386MAX AND QEMM-386 support Windows 3.1 and Windows' Enhanced mode. Both attempt to patch up Windows system files to ensure compatibility. Both also share one problem: When Windows is upgraded, QEMM-386 and 386Max have to be upgraded as well. When we attempted to run Windows 3.1 on an older version of QEMM-386, we received a "Hey, upgrade to DOS 5.0 and try again" message. This incompatibility problem is more complex with memory managers than with other programs because Windows handles some of its own memory management, causing conflicts.

Both vendors assure us that their packages will continue to be Windows-friendly and that Microsoft tests compatibility before releasing new versions of Windows. Our advice: Get the latest release of your memory management package before upgrading to a new version of Windows.

VERDICT WINDOWS COMPATIBILITY

Neither product offers Windows-specific utilities. Both 386Max and QEMM-386 could use Windows front ends for viewing summaries of memory usage.

WINNER NEITHER

EASE OF CONFIGURING MEMORY

QEMM-386'S OPTIMIZE and 386Max's Maximize configure the main memory management program, then move device drivers and TSRs into upper memory blocks (UMBs). Both run immediately after installation and after you add any device drivers or TSRs to your PC's startup files. How much memory the programs free up is important, but you'll also want to consider how well they communicate what they're doing to your setup.

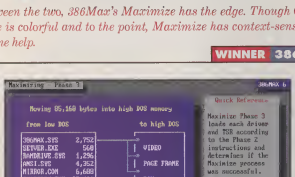
Optimize's colorful screens display memory configuration options after analyzing your system. Online help is missing, though the screens adequately explain what's going on. You must press Enter to proceed at every step. A memory summary screen details how many resident programs Optimize loaded into high memory and how much RAM each used.

386Max's Maximize presents information clearly and always offers context-sensitive help. If you select the Quick-Maximize option, the whole process takes place automatically. The only time you need to intervene is to press Enter after the final summary screen.

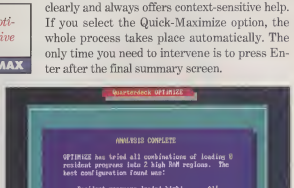
VERDICT EASE OF CONFIGURING MEMORY

Between the two, 386Max's Maximize has the edge. Though Optimize is colorful and to the point, Maximize has context-sensitive online help.

WINNER 386MAX



386Max While Maximize configures the main memory management program and loads device drivers and TSRs high, it narrates the process with text and diagrams.



QEMM-386 After trying to load different combinations of programs high, Optimize displays the "best configuration" screen above. Unfortunately, online help is unavailable.

ROM SHADOWING

TO INCREASE AVAILABLE upper memory so that you can load more device drivers and TSRs into UMBs, both 386Max and QEMM-386 perform *ROM shadowing*. This technique swaps out unused parts of a PC's BIOS, video BIOS, hard drive, and network BIOS, and replaces them with usable RAM in the form of UMBs. This works because a big chunk of the BIOS is used only for diagnostic purposes during startup. Whenever your

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system needs to access ROM, the swapped-out parts are quickly placed back into memory—one hopes just in time.

And that's the inherent risk. ROM shadowing opens up more UMBs for your applications but, if your ROM isn't swapped back into memory when it's needed, your system crashes. So, use ROM shadowing only when necessary.

The ROM-shadowing program included in QEMM-386 is called Stealth; 386Max offers ROM search. Both techniques free up memory, but Stealth is definitely the more aggressive of the two. On our Windows network server it opened up 56K of memory bank F—its full 64K is normally reserved for the PC's BIOS. But along with Stealth's aggressiveness in commandeering memory comes a greater chance of system crashes. QEMM-386's manual points out that Stealth should be used sparingly.

VERDICT ROM SHADOWING

A cautious nod is given to QEMM-386's Stealth.

WINNER QEMM-386

LOADING HIGH

386Max and QEMM-386 insert special commands in CONFIG.SYS and AUTOEXEC.BAT that move device drivers and TSRs from conventional, or low, memory and squeeze them into UMBs. Both programs provide options for dealing with expanding device drivers, drivers that load in multiple pieces, and drivers that must maintain a toehold of conventional memory.

We tested 386Max and QEMM-386 at loading pro-

LOAD HIGH—386-BASED STANDALONE

	NO MEMORY MANAGER	DOS 5.0	WINNER 386MAX	QEMM-386
DEVICE DRIVERS				
Setver	Low	High	High	High
RAMDrive	Low	High	High	High
ANSI	Low	High	High	High
TSRs				
Mirror	Low	High	High	High
SmartDrive	Low	High	High	High
Mouse	Low	High	High	High
DOSKEY	Low	High	High	High
Free conventional memory	520K	621K	624K	621K
Free upper memory	0K	99K	68K	71K

LOAD HIGH—WINDOWS NETWORK SERVER

	NO MEMORY MANAGER	DOS 5.0	WINNER 386MAX	QEMM-386
DEVICE DRIVERS				
Setver	Low	High	High	High
RAMDrive	Low	High	High	High
Stacker	Low	High	High	High
CD-ROM adapter	Low	High	High	High
Sound card	Low	High	High	High
TSRs				
Mirror	Low	High	High	High
SmartDrive	Low	High	High	High
Network adapter	Low	High	High	High
NetBIOS	Low	High	High	High
Network redirector	Low	High	High	Low
Network server	Low	Low	High	High
CD-ROM extensions	Low	Low	Low	Low
Free conventional memory	388K	551K	586K	567K
Free upper memory	0K	38K	0K	74K

LOW = PROGRAM LOADED INTO CONVENTIONAL MEMORY
HIGH = PROGRAM LOADED INTO MEMORY

grams into high memory on a basic 386-based MS-DOS system and a 486-based multimedia network server. For comparison, we ran the same tests using DOS 5.0's memory management device drivers, EMM386 and HIMEM.SYS.

In the 386 PC test, we loaded three common device drivers high—Setver, RAMDrive, and ANSI—along with four TSRs—Mirror (with deletion tracking), SmartDrive (DOS's disk cache), the mouse device driver, and the DOSKEY command-line editor. With no memory manager present, 520K of conventional memory is available after the three device drivers and four TSRs load into conventional memory. (See the chart "Load High—386-Based Standalone" on page 238 for the results.) With DOS 5.0's EMM386 and HIMEM.SYS, 621K of conventional memory is available. QEMM-386 tied with DOS 5.0, also freeing up 101K of RAM. 386Max, however, was able to find another 3K of RAM, bringing its total of available conventional memory to 624K. Both DOS 5.0 and QEMM-386 created more upper memory than 386Max did, but this was of little use because they couldn't take advantage of the extra space to increase conventional memory.

The network server test burdened the memory managers with device drivers and TSRs. The following drivers were loaded in CONFIG.SYS: Setver, RAMDrive, Stacker, a CD-ROM SCSI adapter driver, and a sound card driver. The AUTOEXEC.BAT file was loaded with Mirror (with deletion tracking), SmartDrive, the four network drivers (adapter, NetBIOS, and the redirector and server utilities), and the Microsoft CD-ROM extensions.

After the server system loaded all that, only 388K of conventional memory was free—not even enough to start up Windows. With the DOS 5.0 memory management cadre (EMM386 and HIMEM.SYS) installed, that number jumped to 551K. The network server and CD-ROM extensions could not fit into upper memory. 386Max loaded an additional 35K of device drivers into upper memory, but it still could not load the CD-ROM extensions—although Maximize insisted that "everything" loaded high. Even running 386Max's ROM search didn't help.

QEMM-386 failed to load the network redirector or the CD-ROM extensions high, making its total free conventional memory 567K—more than DOS 5.0 yet 19K short of 386Max. With Stealth enabled, the situation did not improve. Although Stealth opened a 56K "hole" of upper memory in bank F to increase free upper memory to 74K, the redirector and CD-ROM extensions refused to load high, no matter which options were selected. This was even more disappointing than not having the memory available.

VERDICT LOADING HIGH

The hands-down winner here is 386Max. Even on subsequent tests using Optimize and Maximize, 386Max consistently loaded more device drivers and TSRs high than QEMM-386, and its conventional memory totals were always larger.

WINNER 386MAX

VIDEO MEMORY TRICKS

MEMORY MANAGEMENT isn't limited to loading device drivers and TSRs into upper memory. Another common strategy is to sacrifice high-resolution EGA and VGA graphics for more room in conventional memory. You do this by raising the 640K limit another 64K or even 96K (you set the amount with switches). It means you could attain a whopping 736K of free conventional memory.

This trick works because immediately above the 640K barrier lies video RAM, which is a 64K bank for systems equipped with an EGA or VGA graphics adapter. That memory area is normally used when your computer is operating in graphics mode. Otherwise, your system uses only 4K of video RAM for color text, and this 4K bank lies about 96K above the 640K barrier.

386Max's VIDMEM option raises the roof on the 640K barrier to include that unused 96K. With the line VIDMEM=CGA in your 386Max profile, you can have up to 736K of available conventional memory.

QEMM-386 takes a different approach to controlling video memory. It uses a standalone TSR called VidRam. When VidRam is active and resident, your PC can access another 64K or 96K of conventional memory. Like any TSR, VidRam is controlled from the command line or by a line in the AUTOEXEC.BAT file, and it works regardless of which memory manager you're using.

The downside to this video memory magic is that you can forget about running Windows, or any other application that uses graphics. Even switching into the text-preview mode in WordPerfect 5.1 will make the screen a jumbled mess. However, QEMM-386's VidRam will detect such a move and display a warning; you can then disable it.

VERDICT VIDEO MEMORY TRICKS

QEMM-386 and 386Max are equally adept at making use of unused video RAM, but the nod goes to QEMM-386 for VidRam's warning feature and its flexibility.

WINNER QEMM-386

USERS WARM UP TO QEMM-386

Programs that use EMS and move TSRs into UMBs are not for the faint of heart. Fortunately, you don't have to understand all the acronyms or types of memory to use a third-party memory manager. In fact, the mark of usability for a memory manager is how efficiently it operates without your intervention. Eventually, however, you will be driven to fiddle with the program to squeeze out the last kilobyte of memory, so you'll want a memory manager that also makes it easy to change memory settings manually.

To find out which program—Qualitas's 386Max or Quarterdeck's QEMM-386—is easier to use, we put the latest versions in the hands of some impartial users at the *PC/Computing* Usability Test Center. They used two identical Amkly 486DX/33s, each with 8MB of RAM and a 130MB hard drive.

Each PC loaded a virus-checking TSR and a couple of device drivers at boot-up by calling them from the CONFIG.SYS file. To measure the conventional memory available before the memory manager was installed, we devised a batch file that extracted a value for the largest executable program size. This batch file was also used as an alternate memory diagnostic tool throughout the testing.

A CLOSE CALL

QEMM-386 and 386Max are well matched in terms of clarity of interface, flexibility, and power, but QEMM-386 drew warmer responses from testers because they found it easier to operate. For instance, installing 386Max took our users an average of 11 minutes and 17 steps; with QEMM-386, installation lasted only 3 minutes and involved only 8 steps. QEMM-386 also made users somewhat more productive, taking on average less time to complete the same task as with 386Max. On the 200-point overall-satisfaction questionnaire completed by the test group, QEMM-386 outscored 386Max 159 to 130.

That's not to say that QEMM-386 is perfect. For example, QEMM-386 offers no utility for examining the system memory profile, which frustrated our testers. They eventually resorted to DOS 5.0's EDIT.EXE, but because they had to search out a method for viewing the file, the task took more than twice as long as with 386Max. QEMM-386 also lacks a utility for safely updating the memory management device driver.

According to the testers, both memory managers need more in-depth documentation on setup choices and configuration options. Most felt that the documentation did not provide the opportunity to learn how to move beyond the installation's default settings. This was especially so with QEMM-386; because it was less intimidating, it fostered a greater interest in its internal workings.

Simplicity and ease of use can be as important as efficacy and depth when it comes to complicated programs such as memory managers. Consider your level of expertise when choosing a program. —*Nathan Garcia*

USABILITY HIGHLIGHTS ✔ = WINNER

	386MAX 6.02	QEMM-386 6.02
Installation		✔
Memory diagnostics		✔
Check specific memory area		✔
Save system profile to disk		✔
View profile from disk	✔	
Optimize system		✔
Customize configuration	✔	
Intuitiveness	✔	
Times help consulted (average)	4	5
Calls to tech support (average)	None	1
Productivity		✔
Time per task (minutes)	7.2	6.1
Time per task excluding installation (minutes)	6.7	6.6
Tester satisfaction		✔
Subjective rating (out of 200 points)	**130**	**159**

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EASE OF UPDATING

THE GREAT THING about a memory manager is that it needs to be run only once. There's nothing to memorize or master. You usually need to think about your memory manager again only after you've updated CONFIG.SYS or AUTOEXEC.BAT or installed a new program. Handling this kind of update with 386Max or QEMM-386 is as easy as running Maximize or Optimize again—no extra switches to throw, files to create, or options to fuss over. On that score, the programs are even.

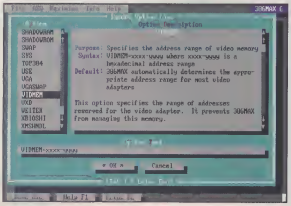
The major difference between the programs surfaces when you need to update or change a switch or parameter in the memory management device driver itself—either 386MAX.SYS or QEMM386.SYS. This is required, for example, when you want to specify an area of ROM to be used by the memory manager or when you need to solve compatibility problems unique to your hardware configuration. With QEMM-386, you have to hunt through the manual to determine which switches and parameters are required. This is doubly difficult because the options aren't alphabetized, nor are they listed together in one convenient section.

You update 386MAX.SYS by using the handy Max utility. Max includes an editor for the 386MAX.PRO text file. 386MAX.PRO, rather than CONFIG.SYS, contains all of 386MAX.SYS's options. You add a new option by pressing the F8 key and then selecting the option from a scrolling list. Descriptions of each option, along with their parameters, appear onscreen. 386Max's file editor is so smart, it's amazing that the competition hasn't cloned it.

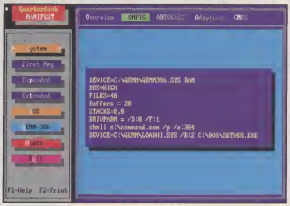
VERDICT EASE OF UPDATING

386Max wins by a small but significant margin. The packages update equally well with Maximize or Optimize. But thanks to the Max utility in 386Max, you don't have to leaf through the manual to find the options you need to update your memory management device driver.

WINNER 386Max



386Max To change a switch or a parameter in 386Max's driver, just call up the file editor for the 386MAX.PRO file. Here, the VIDMEM option is being added to reserve an address range for video adapter memory.



QEMM-386 Updating QEMM-386's driver is a chare. Although the report utility Manifest displays the contents of the CONFIG.SYS file (abave), to edit the file you have to apen it in a plain-text editar.

MEMORY REPORTING

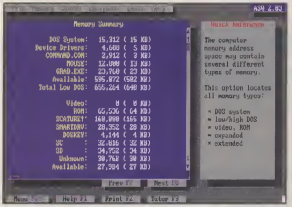
Both 386Max and QEMM-386 include simple memory report and diagnostic utilities. 386Max features ASQ 2.0 (Version 1.0 is available on CompuServe and many bulletin boards). QEMM-386 comes with Manifest 1.1, which is also available separately for $59.95. These system snoopers describe the system and its peripherals and tell you what's going on in memory. But neither program offers hardware diagnostics; they simply report on your system's components.

Manifest is the more complete memory reporter. It organizes the information better than ASQ does and offers suggestions for configuring your system to maximize memory use. On the other hand, ASQ offers something Manifest doesn't: a complete online memory tutorial and detailed online help.

VERDICT MEMORY REPORTING

The interface of QEMM-386's Manifest utility is more hospitable and its display is more readable than that of 386Max's ASQ. While ASQ is a wonderful companion tool for 386Max and the tutorial and detailed online help are valuable, it doesn't stand on its own.

WINNER QEMM-386



386Max The reporting utility ASQ provides basic memory information and hardware diagnostics, such as this scrollable memory summary, but it doesn't tell the user the type of memory each program is using. Its strongest features are its online tutorial and detailed help.

QEMM-386 Manifest is a complete memory reporter with an attractive layout. When you select one of the buttons from the list on the left, the relevant categories appear across the top of the screen. The First Meg button calls up a list of programs in conventional memory.

Problems with Compressed Disks?

STACKER AND YOUR MEMORY MANAGER

Data-compression programs such as Stacker (Stac Electronics, Carlsbad, CA; 800-522-7822, 619-431-7474) complicate DOS memory management. It's not that Stacker is incompatible with memory managers or that its device driver can't be loaded high. The problem arises when you use Stacker, or other data-compression programs, to compress your boot disk (drive C:). This can really throw your memory manager's automatic setup and memory-analysis utilities for a loop.

Essentially what Stacker does is fold all your files in half and stuff them into a giant STACKVOL file on drive C:. The extra space created when your files are compressed in effect doubles the size of your hard drive. When your computer boots up, a device driver in CONFIG.SYS mounts the STACKVOL file as another drive in your system. For example, the STACKVOL file becomes drive D:.

However, to ensure compatibility with your PATH command, batch files, and so on, the Stacker drive letter is swapped with the boot drive letter, C:. So if STACKVOL is mounted as drive D:, that drive will become drive C: and the original drive C: will become drive D:. Your memory manager may not be aware of this and will always work with drive C:. Havoc ensues: Where are the device drivers? Where is the memory-management utility?

The first priority is to make sure that copies of all your device drivers and other programs mentioned in CONFIG.SYS appear on both the host drive and the compressed disk. A shadow directory (including the files) for your memory management program must also appear. This must be set up prior to memory optimization. (It's a good idea to install your memory manager once on the Stacker drive and again on the host drive.)

Second, if you're using Stacker, specify the /SYNC switch in the line in CONFIG.SYS that loads the SSWAP program. This directs Stacker to cross-check CONFIG.SYS and AUTOEXEC.BAT on the Stacker drive and the host drive. If it encounters any differences, Stacker alerts you and offers to update the files automatically.

If your memory optimization program fails when Stacker updates CONFIG.SYS, then copy CONFIG.SYS and AUTOEXEC.BAT to a bootable floppy disk. Boot with that disk in drive A:, and then run your memory optimization program. After your device drivers and TSRs are configured, copy the CONFIG.SYS and AUTOEXEC.BAT files from the boot disk to drive C: and the host drive. Finally, reset your system.

Both 386Max and QEMM-386 offer solutions for troubles that you may encounter when you're using them with Stacker; additional information can be found in the Stacker manual or from Stac Electronics' technical-support line (619-431-6712).

Other disk-compression utilities such as AddStor's popular SuperStor and SuperStor Pro may also confuse your memory manager. Call AddStor's technicol support at (415) 306-2430 for more information.

One of the best solutions may be not compressing your boot disk (drive C:) at all. Create an empty Stacker drive or stock only your other hard drive partitions. Unfortunately, this isn't an option for anyone whose computer has limited disk space.

386MAX AND QEMM-386 SIDE BY SIDE

● = Yes ○ = No

	386MAX 6.02	QEMM-386 6.02
GENERAL		
386 memory support	●	●
286 memory support	●	○
Online memory tutorial	●	●
BASIC FEATURES		
Configuration utility	●	●
Loads device drivers high	●	●
Loads TSRs high	●	●
Simulates expanded memory	●	●
COMPATIBILITIES		
Laptop sleep mode	○	●
DOS Protected Mode Interface (DPMI)	●	●
Expanded Memory Specification (EMS)	●	●
Virtual Control Program Interface (VCPI)	●	●
Windows 3.1	●	●
Virtual DMA Services (VDS)	●	●
Extended Memory Specification (XMS)	●	●
RESOURCE MANAGEMENT		
Steals video memory	●	●
BUFFERS	○	●
FCBS	○	●
FILES	○	●
LASTDRIVE	○	●
OTHER UTILITIES		
Memory reporting	●	●
Memory summary	●	●
UMB summary	●	●
Editor	●	○
RAM drive	●	○
Disk cache	●	○
Uninstall	●	●

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Circle 168 on reader service card.

A DOZEN WAYS TO EKE OUT THOSE LAST FEW BYTES OF RAM

1. LOAD DOS INTO THE HIGH MEMORY AREA

The command that opens up the most conventional memory is DOS=HIGH in CONFIG.SYS. This requires the presence of an XMS device driver, such as DOS's HIMEM.SYS, 386Max, or QEMM-386. By loading the DOS kernel into the high memory area, you free some 50K of low memory.

2. EVALUATE THE USEFULNESS OF DEVICE DRIVERS AND TSRs

It's amazing how many programs you don't use yet nevertheless include in your CONFIG.SYS or AUTOEXEC.BAT file. Do you really need the ANSI.SYS device driver? Unless you have batch files that use its commands, your probably can do without it. Loading ANSI.SYS, the mouse device driver, or DOSKEY in Windows is necessary only if your DOS applications that run under Windows require them. Otherwise, you can dispense with those device drivers and TSRs, and save yourself almost 20K of conventional memory.

3. LOAD DEVICE DRIVERS AND TSRs HIGH

Even if they won't all fit, the increase in memory savings will be worth it.

4. LOAD RESOURCES HIGH

Load the BUFFERS, FCBS, FILES, and LASTDRIVE resources into upper memory. Presently, only QEMM-386 has the tools that let you do this. This little trick can save up to 6K on some systems.

5. SET STACKS=0,0 IN CONFIG.SYS

Common sense dictates that if your CONFIG.SYS file lacks a STACKS command, then DOS won't create any internal stacks. (A *stack* is an amount of memory reserved for keeping track of internal operations.) Unfortunately, a missing STACKS command reflects a default setting, which can eat up from 2K to 4K of internal stack space. Chances are your system doesn't need that stack space, so insert the line STACKS=0,0 in CONFIG.SYS. This sets the stack space to zero, returning your 2K to 4K of RAM. (Windows' SETUP program, run from the command prompt, requires the line STACKS=9,256 before it can run. After that, you can reset it to STACKS=0,0.)

6. SET LASTDRIVE EQUAL TO YOUR LAST DRIVE

Many users are told to set LASTDRIVE=Z in CONFIG.SYS. This gives you flexibility in naming your network drives, and it allows you to use the SUBST command to alias subdirectories as disk drives. By setting LASTDRIVE equal to your last drive (including network connections and SUBST options), you can save yourself about 80 bytes per drive letter. (Keep in mind that DOS automatically allocates drive letters for existing hard drives and RAM drives, but not for Stacker or compressed drives.)

7. SET BUFFERS=15 IF YOU'RE USING A DISK CACHE

Disk caches are in vogue, especially since DOS now comes with the Windows' SmartDrive disk cache. If you're using SmartDrive or another disk cache, then you can pare

UTILITIES AND TOOLS

THE POWER USER'S appreciation for a memory manager doesn't end after Optimize or Maximize is finished running. Eventually, the urge to fiddle—to try to squeeze even more bytes of conventional memory out of a PC—takes control.

QEMM-386 is bristling with tools for tweaking. But to learn about them, you must search the back of the manual, which is probably why few people ever encounter these gems. The tools are BUFFERS.COM, FCBS.COM, FILES.COM, and LASTDRIV.COM. These command-line programs store MS-DOS resources in high memory. They augment the storage set aside by their counterpart DOS commands in CONFIG.SYS. First you set up a minimal configuration in CONFIG.SYS, then add extra buffers, files, or drive letters using the four commands in AUTOEXEC.BAT or at the DOS prompt. We picked up an extra 6K on the basic 386-based test system by loading BUFFERS, FILES, and LASTDRIVE high. Still, this wasn't enough for QEMM-386 to be competitive with 386Max in overall memory reclaimed.

QEMM-386 features another perk for users of portable systems—support for the sleep mode available in some laptops. On such a laptop, a memory manager may wake up cross-eyed when the system kicks into operation after a period of inactivity, but QEMM-386 recovers gracefully.

386Max comes with a few extras of its own. In case you can't decide what to do with all that extra extended memory in your 386 system, you get two handy memory utilities with the program: QCache, 386Max's disk cache, which replaces SmartDrive; and 386Disk, a RAM disk driver that replaces RAMDrive. And 386Max now includes Move'em, a program that loads device drivers and TSRs into UMBs on 286 and 8086/8088 PCs. (You do need LIM EMS 4.0–compatible expanded memory hardware on your PC to make this happen.) A version of 386Max for IBM PS/2s called BlueMax is available for $124.95.

In addition, Quarterdeck makes a 286-based memory management package called QRAM (pronounced "cram"), which is available for $79.95. QRAM can be

down the BUFFERS setting in CONFIG.SYS to 20 or even 15 and save yourself 1K to 2K of memory. Buffers are a primitive type of cache, and the memory they use isn't necessary if you have a true disk cache installed.

8. SET FILES=30 OR LESS

Disk-intensive programs require a high value for the FILES setting. However, anything over 30 is usually a waste of memory. Consider lowering this value; when you see an error message indicating not enough file handles, specify a slightly higher value.

9. FIND EXTRA UMBs

Most memory managers make a valiant effort to find usable regions of upper memory, yet sometimes they fail. Use a diagnostic utility to map out upper memory in your PC. Scour the listings for chunks the memory manager may have missed. A common trick is to use the monochrome region (memory between segments B000 hex and B7FF hex) for upper memory blocks. 386Max and QEMM-386 have switches to include this region automatically.

10. MOVE THE PAGE FRAME

DOS 5.0's EMM386.EXE puts the EMS page frame at bank D in memory (segment address D000 hex). The *D*, in this instance, stands for *Dumb*. EMM386 ignores bank E, because it assumes that you have an IBM or Compaq machine, both of which have an extended BIOS in bank E. If you're not using a PS/2, a Compaq, or any machine with an extended BIOS, you can specify bank E for your page frame. This is done with EMM386.EXE's FRAME=E000 switch. (Make sure there's nothing in bank E before you try to do this.)

11. DECREASE MEMORY FOR THE ENVIRONMENT

DOS 5.0 allots 256 bytes of conventional memory for its environment. Some users increase this value to 1K or more, yet most of that space remains unused. To optimize the environment's memory, calculate the space you need by typing SET>*filename* at the DOS prompt and then using the DIR command to find out the size of the file. Add 48 bytes to the file size to be safe, and then specify that value when you load COMMAND.COM using the SHELL= command. For example, if the file size is 144, you would type

```
SHELL=C:\DOS\COMMAND.COM C:\DOS\ /E:192 /P
```

In this example, 192 bytes have been set aside for the DOS environment.

12. USE STACKER 2.0 ON RAM DRIVES

RAM drives work most efficiently in extended memory, so don't create them in expanded memory. (You definitely don't want a RAM drive occupying precious conventional memory.) In any event, consider using Stacker on your RAM drives. This way you can maintain a RAM drive that is effectively twice as large as the amount of RAM it uses up. For example, if you create a 512K RAM drive, you can double its size to 1MB without losing a half megabyte of storage. Other disk-compression programs may also offer RAM disk doubling.

loaded high on 286 PCs that are equipped with LIM EMS 4.0-compatible expanded memory hardware.

And finally, both 386Max and QEMM-386 offer unexpected but welcome uninstall utilities—Un-Maximize and Un-Optimize. Both programs are really batch files that delete your modified CONFIG.SYS and AUTOEXEC.BAT files and replace them with the original versions.

VERDICT UTILITIES AND TOOLS

Both QEMM-386 and 386Max include some cool bonus utilities, but neither set is a knockout. The extra features do very little to free more conventional memory or make your PC perform better.

WINNER TIE

THE BOTTOM LINE

The laurels go to 386Max. The bottom line with any memory manager is how much more memory will it deliver? Some experts say the difference between 619K and 632K of free conventional memory is trivial, since a program will rarely refuse to load when there is more than 512K of conventional memory. But why load any device driver or TSR below 640K if you don't have to? You're going to need much more than 512K to run DOS applications under Windows.

Of the ten categories, 386Max won four, QEMM-386 won three, and there were three ties. While QEMM-386 scored better in our usability tests, 386Max excelled in the most important tasks for a memory manager—ease of configuring, ease of updating, and loading high.

Dan Gookin is the author of The Microsoft Guide to Managing Memory with DOS 5 *from Microsoft Press.*

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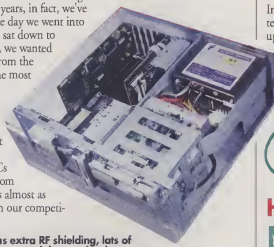

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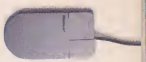

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DOS

Six Ways to Work Smarter With Your Floppy Disks

A FISTFUL OF COPYING, FORMATTING, AND TRANSPORTING TECHNIQUES THAT BYPASS DOS'S ROUNDABOUT WAYS WITH THE HUMBLE FLOPPY. **BY JEFF PROSISE**

LARGE, INEXPENSIVE HARD disks may be all the rage these days, but how many of us can do without the humble floppy disk? For many of us, it's still the first thing we reach for to transport files between PCs or to archive data. Here are some tips for using floppy drives more productively and for skirting the obstacles that DOS throws in the way of using floppy disks.

Fast Formatting

How often have you reformatted a floppy disk in order to erase the files and subdirectories on it? Until DOS 5.0, reformatting took just as long as formatting because DOS reinvented the wheel with every format. In DOS 5.0, you can reformat floppy disks quickly with a /Q (for Quick) switch. The command

```
FORMAT A: /Q
```

formats the disk in drive A: in a fraction of the time required for a full format. To further speed things up, you can combine the /Q and /U switches. The only drawback is that disks formatted with the /U switch cannot be unformatted with the UNFORMAT command.

If you want to avoid the FORMAT command's pesky prompts to insert disk, label disk, and insert another disk, insert a disk into drive A: and enter

```
FORMAT A: /AUTOTEST
```

DOS immediately begins formatting the disk in drive A: and returns you to the command prompt when the format is complete. No fuss, no muss. To format a stack of floppies using this method, slip in the next disk, press F3 to bring the command back to the prompt, press Enter, and repeat with the remaining disks. The drawback? The /AUTOTEST switch works in conjunction with the /U and /S switches, but not with /Q. Keep in mind that /AUTOTEST also formats to the full capacity of the drive, so be careful not to use it to reformat any old low-density floppies.

Smarter Copying

DISKCOPY is unique among DOS commands in accepting the same drive letter as both the source and destination for a copy. If you type

```
DISKCOPY A: A:
```

DISKCOPY will prompt you to swap disks in and out of drive A: as needed. If you try to accomplish the same thing with COPY *.* DOS will tell you, "File cannot be copied onto itself."

DISKCOPY has two limitations. Since it copies entire disks, byte for byte, you can't use it to transfer just a few files between two disks in the same drive. (To do that, check the Hot Tip "DRIVER.SYS Makes Your Floppy Drive Do Double Duty" on page 251.)

DISKCOPY also can't copy disks between unlike drive types. For example, if you try to copy a 5¼-inch floppy to a 3½-inch floppy, DISKCOPY tells you that the disk types are incompatible and terminates the routine. Don't despair—use XCOPY:

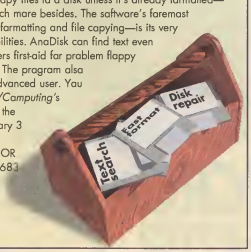
```
XCOPY A: B: /S /E
```

This copies everything (including subdirectories) from drive A: to drive B:, regardless of drive type. The only things XCOPY won't find are hidden and system files. If the disk in drive A: contains

/// DOS Helper ///////////////

AnaDisk 2.07

One thing that DOS can't do is copy files to a disk unless it's already formatted—but AnaDisk can, and it does much more besides. The software's foremost benefit—beyond one-step floppy formatting and file copying—is its very thorough set of text-search capabilities. AnaDisk can find text even in deleted files. And AnaDisk offers first-aid for problem floppy disks via diagnostics and fix-ups. The program also includes a sector editor for the advanced user. You can download AnaDisk from *PC/Computing's* online forum, PC/Contact, under the filename ANADSK.ZIP in data library 3 (Utilities/Misc.), or order it from Sydex, P.O. Box 5700, Eugene, OR 97405; (503) 683-6033; (503) 683-1385 (BBS, 9600 N-8-1).



PC/Contact

hidden and system files that you want to copy, type

```
ATTRIB -H -S A:\*.* /S
```

in DOS 5.0 to strip the hidden and system attributes before copying. (Or use the Hot Tip "Strip File Attributes with One Command" at right.)

Swap Drive Letters with SUBST

Nearly everyone has encountered an installation program that insists on running from drive A:. Suppose the installation program is on a 5¼-inch disk, and your drive A: is 3½ inches and drive B: is 5¼ inches. What do you do? You could type ASSIGN A=B to fool the program into thinking drive B: is really drive A:. However, a better solution is to type

```
SUBST A: B:\
```

Once the program is installed, type

```
SUBST A: /D
```

to cancel drive redirection. Why is SUBST preferable to ASSIGN? For years, Microsoft has warned that ASSIGN may not be compatible with future versions of DOS. It appears that these words were prophetic; DOS 6.0 will drop the ASSIGN command.

One Large File, Many Disks

It's not uncommon to transport files between PCs on floppy disks (a method sometimes referred to as "Sneaker-Net"). But what do you do with a file that won't fit on a single floppy? Simple. Break it up with the BACKUP command:

```
BACKUP BUDGET.XLS A:
```

This copies the file BUDGET onto drive A:. If the file is too big for one floppy to hold, DOS prompts you to insert new ones as needed. To reassemble the file on another PC, insert the first floppy in drive A: and type

```
RESTORE A: C:BUDGET.XLS
```

DOS prompts you to insert the floppy disks in the order that they were written. The file will be copied to the current directory on drive C: without a hitch—assuming there's enough room on the hard disk, but that's another story. ◪

/// Hot Tips ///

DRIVER.SYS Makes Your Floppy Drive Do Double Duty

When you copy a few files from one 5¼-inch disk to another, you usually have to copy the files to your hard drive and then back to another floppy in the same drive. To avoid this repetitive chore, use DRIVER.SYS—the DOS drive controller—to create an alternate drive letter that corresponds to the same floppy drive.

To install DRIVER.SYS for a system configured with a 1.2MB A: drive, open CONFIG.SYS in a text editor and add this line:

```
DEVICE=C:\DOS\DRIVER.SYS /D:0 /F:1
```

The new drive letter will be installed in the next available drive letter, so make sure your LASTDRIVE statement in CONFIG.SYS can handle the additional drive.

To add a new drive letter for a 1.44MB 3½-inch floppy in the B: drive, change the switches to /D:1 /F:7. Refer to your DOS manual under Customizing Your System for additional drive specifications.

Reboot your computer after adding the device driver, and you'll have two drive letters pointing to the same floppy drive. To copy all your documents from your A: drive to another disk of the same size and format, enter this command:

```
COPY A:\*.DOC D:\
```

You'll be prompted to change disks when necessary. This command assumes you've got a 5¼-inch 1.2MB A: drive and that C: is your only logical hard drive.

JEFF PROSISE

Strip File Attributes with One Command

Can't remove an apparently empty subdirectory? It probably contains a hidden file. If you use ATTRIB *.* -R -H -S to remove the attributes, you'll be typing a lot more than you need to. Instead, use the quick, easy-to-remember comma to remove all attributes with a single stroke:

```
ATTRIB ,
```

To strip all attributes from the current directory and its subdirectories, add the /S switch to the command. Note: Since this technique also strips the archive bit, use the command with care between backups.

JOHN TASCHEK

Check DOS Versions in Batch Files

Not every PC has DOS 5.0 installed, so build version dependencies into your batch files to ensure that the current DOS version supports your batch file. First, enter these lines in a text editor, and save the file as DOSVER.SCR:

```
N DOSVER.COM
E 0100 B4 30 CD 21 8A FC B3 0A
E 0108 F6 E3 02 C4 B4 4C CD 21
RCX
10
W
Q
```

Next, enter this command in the subdirectory where you saved DOSVER.SCR to create the program DOSVER.COM:

CONTINUED ON PAGE 252

PC Contact

THIS MONTH'S FREE SOFTWARE All the public-domain and shareware programs, batch files, and utilities featured in *PC/Computing* each month are available on our online service, PC/Contact, or on disk from Public Brand Software for a fee. Here's a sampling of the programs you'll find this month.

Hunter ..... **Windows, page 256**
If you're having trouble tracking down files, enlist the aid of Hunter, a powerful $15 shareware text- and file-search utility. Hunter locates files based on filename wildcard specs, file-date ranges, and text strings. Once you find the files you want, you can execute programs directly from within Hunter's program window. Download Hunter from data library 3 (Utilities/Misc.) under the name HUNTER.ZIP.

AnaDisk ..... **DOS, page 250**
Ever tried to copy files to an unformatted floppy before you realized that you couldn't do it? AnaDisk lets you do that and more. Among its beneficial features is a thorough set of text-search capabilities that can find text even in deleted files. AnaDisk also has automatic diagnostics and fix-ups, and a sector editor for the advanced user. Download ANADSK.ZIP from data library 3 (Utilities/Misc.).

Get Help Fast from Support On Site
Hardware or software questions? The Ziff Support On Site database provides fast and easy access to online technical support for the leading desktop operating environments and software applications. Select the product you have questions about and enter a description of your problem for a list of documents relevant to your needs. Choose the title that best reflects your situation, and display the full text of the associated documents.

The Support On Site database should be familiar to CompuServe subscribers because it uses most of the same commands in the same way. For example, T (TOP) brings you to Support On Site's top menu, M (MENU) brings you to the previous menu, and OFF or BYE ends your Support On Site search session (but not your CompuServe session). There is a $15-per-hour charge for using Support On Site, so be sure to read the information under the Pricing menu option before you begin a search.

For how to join PC/Contact see page 260.

Hot Tips

CONTINUED FROM PAGE 251

```
DEBUG < DOSVER.SCR
```

DOSVER returns the DOS version to an ERRORLEVEL equal to ten times the major version number plus the minor version number—a value of 33 identifies DOS 3.3, 40 identifies DOS 4.0, and so on. Add DOSVER to the beginning of a batch file to make sure the program will run under the current DOS version. For example, this batch file checks the DOS version and terminates it if it's Version 3.2 or earlier.

```
DOSVER
IF ERRORLEVEL 33 GOTO CONTINUE
ECHO Requires DOS 3.3 or higher
GOTO END
REM [Add Your Batch Commands Below]
:CONTINUE
```

Replace the 33 with 50 in the first line to check for DOS 5.0, and add these statements to any batch file that will be run on multiple PCs.

JEFF PROSISE

Document Your DEBUG Scripts

You've created hundreds of DEBUG scripts, but you have no idea where they came from. Next time you copy a DEBUG script, place a remark statement in the last line, and you'll know the article and page number where you found the script. To place a remark in this month's DOSVER.SCR script, for example, add a comment after DEBUG's Q directive like so:

```
N DOSVER.COM
E 0100 B4 30 CD 21 8A FC B3 0A
E 0108 F6 E3 02 C4 B4 4C CD 21
RCX
10
E
Q
REM PC/Computing :: April 1993 :: Author: Jeff Prosise
```

Save your scripts, and when you've got a question about a program, just open the appropriate SCR file in any text editor, or use DOS's TYPE command to display the code and the comment.

ROBERT HEROLD

Instant Access to Your Directories

Want to list your files and directories at a single keystroke? Using ANSI.SYS's keyboard remapping, you can assign DOS commands to function keys. Here's how to map your F10 key to display a directory listing sorted by name and in wide format. First make sure that ANSI.SYS is loaded in your CONFIG.SYS, then add this line to AUTOEXEC.BAT:

```
ECHO ←[0,68;"DIR /O:N /W /P";13p
```

The left-pointing arrow in the command is the Escape character. In DOS's EDIT, generate the escape character (←) by pressing Ctrl-P and hitting the Esc key. The program uses ANSI.SYS to remap your keyboard scan codes to a command enclosed in quotes. Escape starts off the sequence, and 0,68 corresponds to your F12 key. The last statement—13p—is the code equivalent of the Enter command.

JOHN TASCHEK

Now you don't have to wait for Microsoft to get DOS 7.0

YOU	DOS	DOS + *Query*DOS
Create four subdirectories at once. MIAMI inside FLORIDA inside SOUTH inside USA.	Hey, hey, not so fast. One step at a time.	C:\>MAKE USA\SOUTH\FLORIDA\MIAMI
Remove the directory WINDOWS and all its subdirectories and files, whether read-only or not.	Hello…Luccini's Pizza? It's me, DOS. The usual: two medium pizzas and pop. Yes, it's going to be a long night again.	C:\>WIPE WINDOWS
I want to move the July worksheets from A: to B:	And I want to have dinner with Elvis tonight.	C:\>MOVE A:*.WK1 B: FOR MONTH = 7
Rename all the DATA directories in F: as OLDATA.	Rename *directories???* Yeah sure, real quick.	F:\>NAME DATA.* OLDATA.* FOR DIR RECURSIVE
Delete from drive C: all the files with extension BAK or OLD.	I'll tell you, you and I are like New York, the city that never sleeps.	C:\>DELETE FOR EXT = 'BAK' OR EXT = 'OLD' RECU
List all the files in C:\ which already exist in A:\	Listen, it's late; so don't get choosy with me, OK?	C:\> LIST FOR EXISTS('A:\' + FILENAME)
How many floppies would it take to backup my 1992 files?	Probably a lot.	C:\>TOTAL *.* FOR YEAR = 1992 RECU
Copy all the files to A: except the BAK files (and ask me for another floppy if this one gets full).	Wait until DOS version 325.1	C:\>CP *.* A: FOR EXT != 'BAK'
From now on I want to work only with BAT's, COM's and TXT's.	From now on you are going to do a lot of typing, pal.	C:\>SET FILTER = EXT IN ['BAT', 'COM', 'TXT']
I've got in my hard disk a file with the word FAX somewhere in its name. Find it!	Abort, Retry, Fail?	C:\>LOCATE FOR POS('FAX', NAME) != 0
Pick up all the BAK's scattered throughout the server and put them in the directory \BACKUP.	Hello…Luccini? Make 'em large.	F:\>TRANSFER *.BAK \BACKUP RECU

_Query_DOS turns DOS into the powerful and flexible operating system it should have been. Simply add the _Query_DOS files to your DOS directory and you will:

- Get 40 new commands and functions
- Use conditions in your commands
- Apply any command to entire trees
- Sort, move, merge and transfer files
- Graft, prune and wipe directories
- Get reports on disk usage
- Copy entire trees to floppies
- Set filters and directory levels
- Create directory chains in one step
- Rename, hide and release directories
- Shred, locate and recall files
- And much, much more

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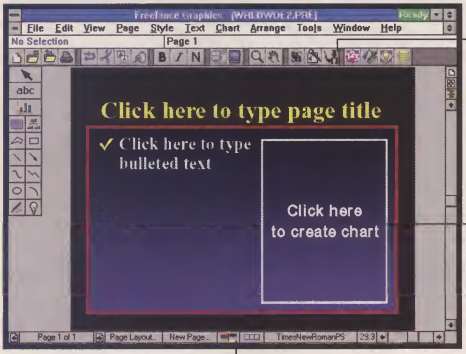
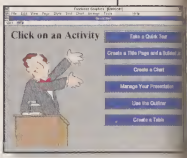
Circle 236 on reader service card.

New Freelance Graphics 2
(Especially the decision t

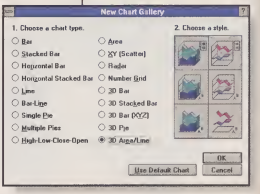


Single-click access to powerful presentation tools makes Freelance Graphics easy to use.



Just click to view the animated QuickStart tutorial. It walks you through your first presentation in under 30 minutes.

Just click to instantly see your presentation in color or B/W. It's automatically optimized for printing both.



Just click to browse through a gallery of 108 ready-to-go chart styles including new 3-D line, 3-D area and radar selections.

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Quick-Print with the Registration Database

EASY OUTPUT WITH PROGRAM MANAGER, FILE MANAGER, AND REGEDIT. **BY CRAIG STINSON**

DID YOU KNOW that you can print a file from File Manager or Program Manager without manually loading an application? The File Manager technique is widely known—select a filename and select File, Print (or drag the entry onto a minimized Print Manager icon); the program that created the document appears onscreen, prints the document, and then goes away. The Program Manager technique is less common. It lets you execute these three commands—open program, print document, close program—in a batch. The only drawback is that neither of these techniques operates automatically—some assembly is required for both.

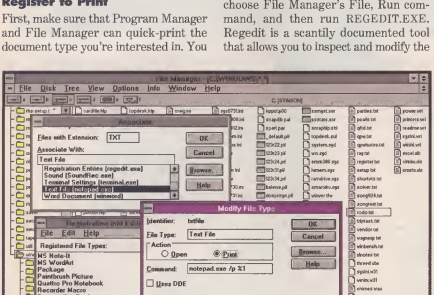
Register to Print

First, make sure that Program Manager and File Manager can quick-print the document type you're interested in. You can't quick-print some documents because either the program that created them can't accept external printing commands or the document type itself isn't printable (sound files, for example). To make sure your document qualifies, select it in File Manager, and choose File, Print. If you don't get an error message, proceed.

With the filename still selected, pull down the File menu again and choose Associate. The dialog box that appears tells you the file's type as identified in the Windows 3.1 *registration database*, a repository of important details about many of your applications that is found in the system file REG.DAT.

Now close the Associate dialog box, choose File Manager's File, Run command, and then run REGEDIT.EXE. Regedit is a scantily documented tool that allows you to inspect and modify the contents of the registration database. When you open Regedit, it displays a list of all the document file types that have been registered on your system.

Double-click on the file type that matches the one you saw in the Associate dialog box, or select that entry and choose the Modify File Type command on Regedit's Edit menu. In the dialog box that appears, click on the button labeled Print (see the screen at the left). If a command string appears in the box labeled Command, you're in business. This is the string that you want to assign to a Program Manager icon.



Make printing from File Manager a drag-and-drop process by using the registration database's Print radio button.

Print from a ProgMan Icon

For example, suppose you keep a daily task list in a file called TODO.TXT, and you want a no-fuss way to print this list at the start of each day. You can print the file from File Manager and associate it with a file type called Text File (notepad.exe). In Regedit, double-click on the Text File entry and select Print. The following command string appears:

```
notepad.exe /p %1
```

To create a Program Manager icon to print the to-do list, use Program Manager's File New command and choose Program Item. On the command line, duplicate the Regedit string, but replace %1 with the filename:

```
notepad.exe /p TODO.TXT
```

To make it obvious that this icon is for printing and not launching, you might

Winapp of the Month

Hunter

Having trouble tracking down files? Hunter, a $15 shareware text- and file-search utility, locates files based on filename wildcard specs, file-date ranges, and text strings. Once you've located the files you want, you can execute programs directly from Hunter's window. Order Hunter from Peter Eddy, 1454 Beacon Street #244, Brookline, MA 02146 (CompuServe ID: 71541,1420) or as HUNTER.ZIP from PC/Contact's data library 3 (Utilities/Misc.).

PCContact

IT WAS THE MOST SUCCESSFUL PRODUCT LAUNCH IN WINDOWS HISTORY.

also want to use the Change Icon command to specify PRINTMAN.EXE as the icon source.

Some document types that you can print using File Manager do not have simple command strings like the ones used by Notepad. For example, if you inspect the Regedit entries for Excel or Quattro Pro for Windows documents, you will find a pair of dynamic data exchange sequences instead of a simple command-line string (one sequence is for use when the parent application is already open, the other for when it is not). If you're proficient in DDE, these sequences could be handy (for example, for inclusion in a program's macro). But you won't be able to assign them to Program Manager icons.

Maintaining REG.DAT

While we're on the subject of Regedit, note that REG.DAT is an important component of Windows, like your INI files. Make sure your backup routine includes REG.DAT. And if you are creating a slimmed-down Windows system that you can fit on your road laptop's hard disk, do not leave the registration database at home.

If you do happen to start Windows without a REG.DAT file in your Windows subdirectory, Windows re-creates one from WIN.INI's [Associations] and [Embedding] sections. But this reconstituted REG.DAT lacks printing information; automatic printing is managed exclusively by REG.DAT.

If you suddenly start getting error messages when you print from File Manager, you may need to rebuild your registration database. Fortunately, you can do this with REG files found in your Windows app subdirectories. (These files are used by the installation procedures of your Windows apps to update the registration database.)

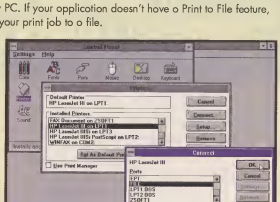
First, open Regedit and choose File, Merge Registration File. In the dialog box, choose your system directory and then the file SETUP.REG. This will reinstate the information that the Windows Setup program put into the database when you installed Windows. Next, use File Manager's File Search command to track down all files on all your hard disks that have the extension .REG. Then repeat the Merge Registration File procedure for each REG file you find.

Hot Tips

Print Documents to File

Need to print a document on another system that doesn't have the application or the fonts the document was created with? Choose Print to File to create a file that you can print from any PC. If your application doesn't have a Print to File feature, use Windows to send your print job to a file.

Open the Control Panel and double-click on Printers. Select a printer from the Installed Printers list (it should be the same type of printer as the one you'll use to print your document), and click on Connect. In the Ports list box, select File: and click on OK. Close the Control Panel, and return to your application.



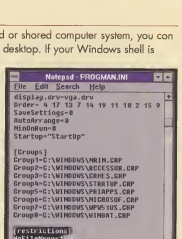
When you print the document to a file, select the printer you redirected to File:. Type a name for the print file when Windows prompts you for one.

When you're ready to send the file to the printer, open File Manager and select the file. Press F8 and type either PRN or the LPT port to which the printer is connected. Click on OK, and answer Yes to any questions Windows asks you.

FRANK C. YANG

Lock Your Desktop

If you're setting up Windows on a networked or shared computer system, you can keep other people from tampering with your desktop. If your Windows shell is Program Manager, simply edit PROGMAN.INI to restrict access to many features. In Notepad or another text-only editor, open PROGMAN.INI (found in the Windows subdirectory) and add the line [restrictions] to the end of the file. Then add lines for the restrictions you want to impose. To disable the Run item on Program Manager's File menu, add the line NoRun=1. To remove the File menu entirely, enter NoFileMenu=1.



To avoid saving changes to the Program Manager desktop, enter the line NoSaveSettings=1. Others will be able to change the desktop's appearance, but they won't be able to save these changes.

Add the line EditLevel=1 to make it impossible for others to create, delete, or rename Program Manager groups. Change that line to EditLevel=2, and they won't be able to create, delete, or rename groups or program items. With EditLevel=3, they also won't be able to

CONTINUED ON PAGE 260

IT SWEPT ALL THE MAJOR USER SURVEYS.

PC Contact

HOW TO JOIN PC/CONTACT For current CompuServe subscribers, just type GO PCCONTACT to access the forum. Cost is based on CIS's fee of $12.80 per hour for 1,200/2,400 bps and $22.80 per hour for 9,600 bps. There is an additional $2.50 TiffNet membership charge per month for all users, which includes a number of free services. For complete information, type GO ZNT:RATES when online.

For new subscribers, follow these steps:

1. Set the following parameters within your communications program: 7 data bits, even parity, 1 stop bit, and full duplex.
2. Call CompuServe's toll-free Customer Assistance Line at (800) 848-8990 (United States) or (800) 635-6225 (Canada). From other countries, dial CompuServe direct at (614) 457-8650. A voice-response system will ask you if you want a local-access number. Then you'll be asked to enter your phone number and the speed at which you want to access the system. CompuServe reads back the local number you'll use to access the service. The call is quick and free.

   Or, call CompuServe with your modem. Set up your modem and telecommunications package using 7 data bits, even parity, 1 stop bit, and full duplex, and call (800) 346-3247. When the modem connects, press Enter. When you see the HOST NAME prompt, type in PHONES and then hit Enter. Then just follow the onscreen menus and note the access phone number for your area.
3. Dial the local-access number with a modem. When you connect to the network, press Ctrl-C to get its attention.
4. At the HOST NAME prompt, type CIS (which is the acronym of the CompuServe Information Service).
5. At the USER ID prompt, enter 177000,5300.
6. At the PASSWORD prompt, enter PC/CONTACT.
7. At the ENTER AGREEMENT NUMBER prompt, type 2100PCC1.
8. If you have trouble, call the Customer Assistance Line at (800) 848-8990. After you follow the above procedures, the CIS system will provide you with your own user ID—called a PPN—and a temporary password. You can then log on and begin to explore PC/Contact. In about two weeks, you'll receive a letter from CIS confirming your PPN and providing you with a new password. You should then change your password by typing GO PASSWORD at any CIS prompt.

TOP PICKS ON DISK You can easily get all the public-domain utilities or shareware covered in this month's issue by calling the disk vendor Public Brand Software at (800) 426-3475 or (317) 856-7571. Ask for this month's Editors' Picks from *PC/Computing*. They're available for $5 or less per disk (most disks have several utilities and programs on them), plus $5 for shipping and handling. Visa and MasterCard are accepted.

Hot Tips

CONTINUED FROM PAGE 258

change a program item's command line. EditLevel=4 prevents all changes to groups or program items.

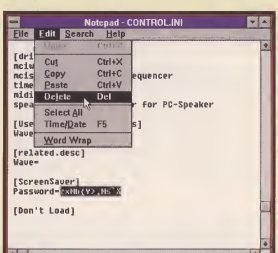
Add the line NoClose=1 to make it impossible to exit Windows once it's been started. You'll have to reboot if you want to leave Windows once you've established this line.

Once you've added the security restrictions you want, save your changes, then exit and restart Windows to make the changes take effect. If you need to change your desktop later, delete these lines from PROGMAN.INI, save your changes, and restart Windows.

DYLAN TWENEY

Bypass Your Password

What do you do when you forget the password to your Windows screen saver? Although you can reboot the system and restart Windows, the Control Panel won't let you enter a new password unless you type the old password first. Fortunately, it's simple to remove the old password manually. Use a text editor, such as Notepad, to open the file CONTROL.INI, found in your Windows directory. The Password= line in the [Screen Saver] section of this file contains your password in encrypted form (so that nobody can find out your password with a text editor). To remove the password, delete everything to the right of the equal sign on that line.



PETER MENESES

Don't Let DOS Stop Your Speedy Getaway

If you keep a DOS window open while you work in Windows, you can't exit Windows unless you first switch to the DOS window and close it. To get rid of this annoyance, start PIF Editor and open DOSPRMPT.PIF, the program information file Windows creates for the DOS prompt. Click on the Advanced button, then select the Allow Close When Active box. Windows displays a warning. Click on OK twice, then close the PIF Editor and save your changes.

If you attempt to exit Windows while the DOS command-line window is open, Windows reminds you that you've left a program running. Click on OK to exit Windows anyway, or click on Cancel to return to Windows.

Caution: Although the Allow Close When Active setting works for any PIF-driven DOS app, be sure you've saved all your work before you exit Windows. A DOS application has no way of knowing that Windows is about to shut down—so it can't ask you whether you want to save your files. If you exit Windows while a DOS application is running, you'll lose any unsaved data in that application.

MATTHEW LAKE

AND IT MADE A LOT OF PEOPLE IN REDMOND, WASHINGTON VERY UNHAPPY.

EXPERT ADVICE TO HELP YOU TAP THE HIDDEN RESOURCES OF POPULAR APPLICATIONS AND UTILITIES

LOTUS 1-2-3

ROUND FRACTIONS UP

Lotus 1-2-3 lacks a function to round fractions to the next highest whole number, but you can do it with a macro. Move to a blank part of your spreadsheet and enter the following macro commands:

```
  A   B
1 '\R {IF
 @CELLPOINTER("CONTENTS")<>@INT
 (@CELLPOINTER("CONTENTS"))}{LET
 @CELLPOINTER("ADDRESS"),@INT(@
 CELLPOINTER("CONTENTS"))+1}
2      {D}
3      {IF
 @CELLPOINTER("TYPE")="B"}{QUIT}
4      {BRANCH \R}
```

To name the macro, move to the cell that contains ^R and choose /Range, Name, Labels, Right, then press Enter. To use the macro, move to the first cell in a column of numbers you want to round up, then press Alt-R. The macro looks at each number in the column, rounds it up if it's a fraction, then moves down to the next cell. It stops when it reaches a blank cell.

JOHN LILLEY
KENMORE, NEW YORK

CATALOG YOUR FLOPPY FILES

Use 1-2-3 to keep track of files and directories on your disks. Start a new worksheet or move to a blank area of the current worksheet, and choose /File, Admin, Table. Then select the type of files you want to see: Press W for Lotus worksheet files only, P for Lotus print files, G for Graph files, or O for all files. Specify the directory you want, and press Enter. Lotus copies the directory information into the worksheet beginning at the current cell. The first column contains filenames, the second and third list each file's date and time, and the fourth lists file sizes. Use /Worksheet, Column, Set to adjust column widths, and /Range, Format, Date to format the date and time columns.

JULES COPLAND
KISSIMMEE, FLORIDA

QUATTRO PRO

DON'T WAIT TO CALCULATE

When you need to make quick-and-dirty calculations, don't clutter your spreadsheet with formulas you'll just have to delete. Instead, enter the formula and press F9 while you're still on the input line. Quattro calculates the formula immediately and replaces the formula with its result. Press Enter to put the result in the current cell.

ALISON PERRY
MADISON, WISCONSIN

////Pro Tips: Spreadsheets/////

JUMP DIRECTLY TO THE LAST FILLED CELL

IS THERE SOME WAY TO MAKE THE CELL POINTER JUMP DIRECTLY TO THE LAST DATA CELL IN A COLUMN OR ROW? I'M TIRED OF TABBING OR PAGING DOWN.

CRAIG WALSH
GARY, INDIANA

As olways, the opprooch depends on which spreodsheet you're using. These mocros work in oll the lotest releoses of 1-2-3 ond Quattro Pro—including the Windows versions. Enter the follawing, leoving B2 ond B6 free for the formulos that follow:

```
  A   B
1 '\r {RECALC \r}
2
3      {END}{LEFT}
4
5 '\d {RECALC \d}
6
7      {END}{UP}
```

Then enter the following farmulos in cells B2 ond B6, respectively:

```
+"{GOTO}IV"&@STRING(@CELLPOINTER("row"),0)&"~"

+"{GOTO}"&@IF(@CELLPOINTER("col")>26,@CHAR(@INT((@CELLPOINTER
 ("col")-1)/26)+64),"")&@CHAR(@IF(@CELLPOINTER("col")>26,
 @MOD(@CELLPOINTER("col"),26)+((@MOD(@CELLPOINTER("col"),26)=0)*26),
 @CELLPOINTER("col"))+64)&"8192~"
```

Finally, assign the ronge nome \r to ronge B1 . . B3, ond the nome \d to B5 . . B7.

Once you've creoted the mocros, jump to the last entry in the current row by holding down the Alt key and pressing R (ar in Windows versions, Ctrl-R). Jump to the lost entry in the current column by pressing Alt-D (or Ctrl-D in Windows versions). Copy the mocros into each spreodsheet—they work across oll layers of a 3-D worksheet.

In Excel, open o mocro sheet, ond enter the fallowing mocro listing:

```
  A
1 =FORMULA.GOTO("RC256")
2 =SELECT.END(1)
3 =RETURN()
4
5 =FORMULA.GOTO("R8192C")
6 =SELECT.END(3)
7 =RETURN()
```

Use the Formulo, Define Nome dialog box to assign the nome JUMPRIGHT to cell A1 and JUMPDOWN to cell A5. Set eoch nome os o Command Mocro. Alsa, estoblish R os the mocro key for the first macro, ond D as the key for the secand. When you return to a spreodsheet, press Ctrl-R to jump to the right ond Ctrl-D to jump down. Save the mocro sheet, ond then open it for every oppropriote work session.

Daniel Gasteiger

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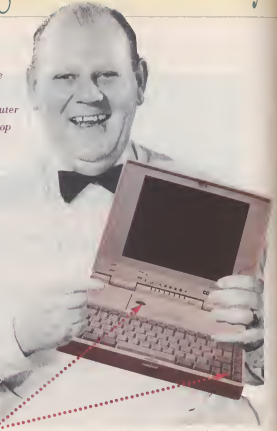

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486DX/33 Best Buy, Laptop Issue, Sept. 1992

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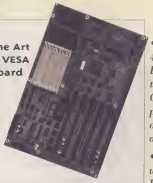

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PCC0431

Circle 195 on reader service card.

MICROSOFT EXCEL

UNDO MULTIPLE SORTS

What do you do if you've sorted a series of columns or rows and you want to return to the original order? Edit, Undo cancels only the effects of the most recent sort operation. To be safe, before you begin sorting, insert an extra column or row in the range to be sorted. In Excel 4.0, enter 1 in the first cell of this row or column and 2 in the next cell, then highlight both with the mouse and drag the lower right corner of the selection to auto-fill the row or column with a series of numbers extending as far as the range you'll be sorting. Then use Data, Sort to organize your data. If at any point you decide you want to return to the original order, select Data, Sort, and specify the auto-filled column as your sort key.

MOIRA MOYNIHAN
TOLEDO, OHIO

OPEN FILES AUTOMATICALLY

Make Excel open several worksheets at once when it starts up. In Program Manager, first copy the Excel icon by holding down Ctrl as you click on the Excel icon and drag it to a new location. Then press Alt-Enter to change the properties of the item that this new icon represents. Click on the Command Line: box, and position the cursor at the end of the command line that starts Excel. Then type a space, followed by the names of the files you want to open, separated by spaces. If the files aren't located in the working directory specified in this dialog box, you'll need to enter their paths, too. When you've entered as many files as you want on this line, change the Program Item Title to reflect the files you've selected. Then click on OK to return to Program Manager. When you double-click on this icon, Excel starts up and loads the specified files.

MATTHEW LAKE
ASSOCIATE EDITOR

QUATTRO PRO FOR WINDOWS

SELECT SEVERAL RANGES AT ONCE

It's easy to copy, move, or delete more than one range at once. Simply select

/// Pro Tips: Word Processing ///

INCREMENT WORDPERFECT INVOICE NUMBERS

I'D LIKE TO BE ABLE TO CREATE AUTOMATICALLY INCREMENTING INVOICE NUMBERS IN WORDPERFECT. IS THAT POSSIBLE?

ED HOWELL
CHICAGO, ILLINOIS

It's easily done with a macro. The macro finds the previous invoice number, reads it into a variable, deletes the number from the document, increments the variable by 1, and inserts the new number in the document. Here's how you do it. First, create your invoice form, and ensure that it contains an invoice number in the following format:

```
Invoice No.: 1
```

To create the macro, use the macro recorder rather than the macro editor, because you can't read a block of text into a variable with the macro editor. Press Ctrl-F10 (Macro Record) and when prompted, give an Alt-key combination or a name that will invoke the macro. Press Enter, type an optional description, then press Enter again.

Press Home, Home, up arrow to move to the top of the document. Press F2 (Search), type INVOICE NO.:, press the space bar once, and press F2 again. Press Alt-F4 (Block), Home, right arrow to block the invoice number. Press Ctrl–Page Up (Macro Commands), 3 (Assign), and type a name for the variable; for this example, we'll use the variable name INVNO. Then press Enter.

Press Ctrl-F10 (Macro Record) to turn off the macro recorder. You'll now make some changes to the macro in the macro editor. Press Ctrl-F10 (Macro Record), type the name or invocation key of the macro, and press 2 (Edit) for the macro editor.

Move the insertion point to the right of the {DISPLAY OFF} code, and press Ctrl–Page Up (Macro Commands). Highlight the {ASSIGN} command and press Enter. Then format the command (don't omit either of the tildes):

```
{ASSIGN}invno ~ ~
```

This command clears the contents of the INVNO variable.

Move the insertion point to the right of {Macro Commands}3invno{Enter}. Press Ctrl-V, Ctrl–left arrow to insert the command {Word Left}. Press Ctrl-V, Ctrl-backspace to insert {Del Word}. These commands delete the previous invoice number.

Press Ctrl–Page Up (Macro Commands), highlight {ASSIGN}, and press Enter. Format the command {ASSIGN}INVNO ~ ~ as above. Press left arrow to move the insertion point between the two tildes, and press Ctrl–Page Up again. Highlight {VARIABLE} and press Enter. Format the remainder of the {ASSIGN} command

```
{ASSIGN}invno~{VARIABLE}invno ~ +1~
```

This adds 1 to the old invoice number.

Move to the right of the final tilde, then press Ctrl–Page Up, highlight {VARIABLE} again, and press Enter. Format the command {VARIABLE}INVNO~ to insert the new invoice number.

Here's the macro code, with line breaks for readability. (To insert a line break in the macro editor, press Enter. The Enter keystrokes are ignored when you run the macro.)

```
{DISPLAY OFF}
{ASSIGN}invno ~ ~
{Home}{Home}{Up}
{Search}Invoice No.: {Search}
{Block}{Home}{Right}
{Macro Commands}3invno{Enter}
{Word Left}{Del Word}
{ASSIGN}invno~{VARIABLE}invno~+1~
{VARIABLES}invno~
```

Press F7 (Exit) to leave the macro editor and save your changes.

George Beinhorn

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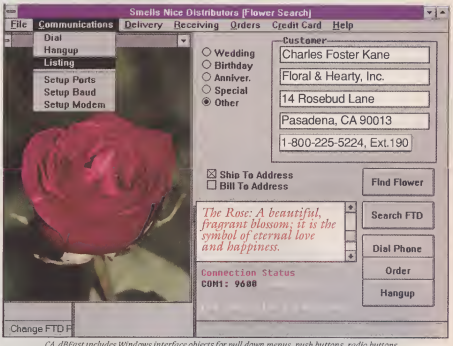

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Software Secrets

the first range, then hold down Ctrl as you select additional ranges. Then use the Edit menu to cut, copy, or delete the ranges in the normal fashion.

To select a three-dimensional range throughout several worksheets, first ensure that the worksheets have adjacent tabs. Select the range you want in the first worksheet, then hold down Shift and click on the last worksheet's tab. An underline appears beneath the worksheets' tabs, indicating that the block has been selected in all of them.

PORTER SMITH
REMINGTON, VIRGINIA

WORDPERFECT

TAG SEVERAL FILES

Use WordPerfect's List Files screen to copy, move, delete, or print several files at once. Press F5 and select the directory you want to see. To tag a file, highlight it and press asterisk (*). Press * again to untag it. Press Alt-F5 to tag and untag all listed files. Any file operations you choose will apply to all the files you tagged.

CHARLES M. OLSEN
DICKINSON, TEXAS

TEMPORARY TABS

When you change tab settings in a document, your changes are permanent. If you want your old settings back, you must reset them manually.

Here's a way to temporarily change the tab settings while saving your old settings: Place the cursor where you want to insert the new tab settings, then press Enter to add a new line.

To save your current tab settings, press Shift-F8 (Format), Line, Tab Set, then press F7 twice to return to your document. This inserts a code containing the current tab settings.

To display the tab code, press Alt-F3 (View Codes). Move up a line to set the new tabs. These tab settings will apply only to the space between the new tab code and the one you just copied.

CHARLES M. OLSEN
DICKINSON, TEXAS

WORD FOR WINDOWS

DOUBLE-ACTION FORMAT KEYS

To change the font of selected text without using the mouse, press Ctrl-F

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the first range, then hold down Ctrl as you select additional ranges. Then use the Edit menu to cut, copy, or delete the ranges in the normal fashion.

To select a three-dimensional range throughout several worksheets, first ensure that the worksheets have adjacent tabs. Select the range you want in the first worksheet, then hold down Shift and click on the last worksheet's tab. An underline appears beneath the worksheets' tabs, indicating that the block has been selected in all of them.

PORTER SMITH
REMINGTON, VIRGINIA

WORDPERFECT

TAG SEVERAL FILES

Use WordPerfect's List Files screen to copy, move, delete, or print several files at once. Press F5 and select the directory you want to see. To tag a file, highlight it and press asterisk (*). Press * again to untag it. Press Alt-F5 to tag and untag all listed files. Any file operations you choose will apply to

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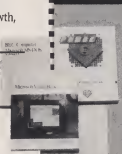

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twice. The Format Character dialog box appears, which allows you to change the font, point size, and formatting of the current selection.

There are other double-action formatting keys. Press Ctrl-P once to change point size; press Ctrl-P twice to get the Format Character dialog box. Ctrl-S selects the Style box on the ribbon; press Ctrl-S twice to display the Style dialog box from which you can define new styles as well as select existing ones.

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

WORDPERFECT FOR WINDOWS

USE THE RIGHT PRINTER DRIVER

For optimal printing, use the right printer drivers. To switch between WordPerfect's and Microsoft's printer drivers, choose File, Select Printer, and choose the type of driver you want.

If you want TrueType fonts, you need the Windows drivers. Also use the Windows drivers if you want your documents to look the same no matter what printer they're output to.

Otherwise, use WordPerfect's printer drivers, since they're faster. They also allow you to switch between portrait and landscape printing using WordPerfect's Paper Size feature (choose Layout, Page, Paper Size). With Windows printer drivers, you must use the Printer Setup dialog box to switch between portrait and landscape printing (choose File, Select Printer, and click on Setup).

If you're already using WordPerfect for DOS, you can avoid font conversion problems by using the DOS version's printer drivers in WordPerfect for Windows. Choose File, Select Printer, and select the WordPerfect printer drivers. Click on Add, switch to your WordPerfect for DOS directory, and select the drivers you already use.

SALLY NEUMAN
SYSOP, PC/CONTACT

AMI PRO 3.0

FAST FORMAT SAVES TIME

Copy formatting quickly with Fast Format. Select an area of text, then choose Text, Fast Format to copy its format. The cursor will change to a paintbrush icon. To apply the copied format, select an area of text with the paintbrush. When you release the mouse button, Ami Pro adds to the text the formatting you copied without removing any attributes.

DIANE HENDERSON
PORTLAND, OREGON

COPY TEXT FROM FILES

Want to paste text from several different files into the document you're working on? Choose File, Open, or press Ctrl-O. Specify a directory and select a file, then click on Preview. Ami Pro displays the document in the preview window. Scroll through the document, select any amount of text, and choose Edit, Copy to copy it to the Clipboard. Then paste it into your current document.

GEORGE BEINHORN
CONTRIBUTING EDITOR

APPROACH

DRAG-AND-DROP INPUT

Windows' drag-and-drop feature can make short work of placing graphics,

Pro Tips: Databases

TRACK PHONE USAGE IN DBASE

I LOG THE TIME I SPEND ON THE PHONE FOR MY CONSULTING WORK, BUT THE FORMULA I USE WORKS ONLY FOR REGULAR OFFICE HOURS AND EVENING HOURS. IS THERE A FORMULA FOR CALCULATING THE DURATION OF CALLS THAT GO PAST MIDNIGHT?

JANE BLIFFREY
SEATTLE, WASHINGTON

To determine total phone time, you would normally subtract the time that you started a call from the time you completed it. The problem with logging hours that begin before and end after midnight (besides the lack of sleep) is that the subtraction results in a negative number. You could add 24 hours to the negative result, but if you build a function that does this into your calculation, your report will show that calls ending before midnight have an extra 24 hours in them. Fortunately, you can solve the problem by using dBASE's MOD (modulo) function to eliminate the extra 24 hours for any calculation that returns a positive number.

Assume that you have a database with four two-digit numeric fields to track starting and ending times—START_HR, START_MIN, END_HR, END_MIN—and a five-digit numeric field called ELAPSED set up with two decimal places to track elapsed time. For simplicity, assume that hours are in military time (2200 is 10:00 p.m., for example), and then use this formula to calculate elapsed time:

```
REPLACE ALL Elapsed WITH ROUND(MOD((1440+End_hr*60+End_min-
Start_hr*60-Start_min)/60,24),2)
```

The formula calculates the number of hours for the call by converting the start and end times into minutes and subtracting the results. It adds 24 hours—or 1,440 minutes—to the result and divides by 60 to convert it back to hours.

The MOD function returns the remainder resulting from the division of two numbers. For example, MOD(13,6), or 13 divided by 6, returns a value of 1—the remainder of the division. To track calls, this formula uses 24 as the divisor so that MOD reduces the hours by 24 for calls that end before midnight. If a call begins at 8:30 a.m. and ends at 11:30 a.m., the formula returns 1,620 minutes, or 27 hours (1440+11*60+30-8*60-30). MOD(27,24) eliminates the extra 24 hours and returns 3 (27/24 = 1 remainder 3)—equal to 3 hours.

For calls after midnight, the calculation always results in a number less than 24, and MOD simply returns that number. If a call starts at 11:30 p.m. and ends at 1:30 a.m., for example, the formula returns 120 minutes, or 2 hours (1440+1*60+30-23*60-30). MOD(2,24) returns 2 (2/24 = 0, remainder 2), and places it in the ELAPSED field.

To finish the calculation, the ROUND function rounds off the result to two digits after the decimal point for readability.

Mike Falkner

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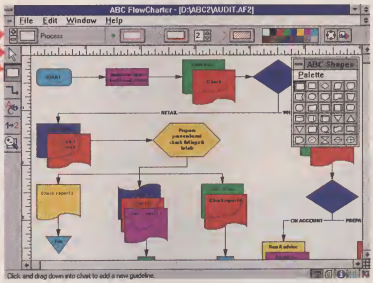

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Circle 187 on reader service card.

sounds, charts, and documents into an Approach database.

Simply open File Manager and Approach, and tile the two programs. Select any file from an object-linking-and-embedding server application, such as Paintbrush or Microsoft Word, drag it to the Approach window, and then release the object over a Picture-Plus field.

The selected file will be automatically embedded within the database—and there is no reason to use menus, functions, or programming calls.

JAN SMITH
STAFF WRITER

PARADOX

FILL IN THE BLANKS

To save time during data entry, you can leave fields blank and use a query to fill them in later. For example, if the CITY field should usually contain "San Francisco," simply leave this field blank every time it calls for San Francisco. (When a record calls for another city, enter its name when you enter the record.) After you have entered all the records, choose Ask and select the database that you just updated. In the CITY field, enter the following phrase:

```
blank, changeto San Francisco
```

Then press F2. Every blank in the CITY field will be replaced with the words *San Francisco*, and Paradox will show you a list of the records that you have just changed.

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

PARADOX FOR WINDOWS

UNIFORMITY FOR BETTER FORMS

Cut all bit-mapped graphics down to a uniform size, and Paradox will fly. When you've got all your images equally sized, go to Design mode, and click on the right mouse button to bring up the Property Inspector. Select Magnification 100%, and you'll see a noticeable performance gain. When you select magnification percentages other than 100%, Paradox has to render the images on the fly, which takes up valuable screen redraw time.

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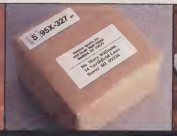

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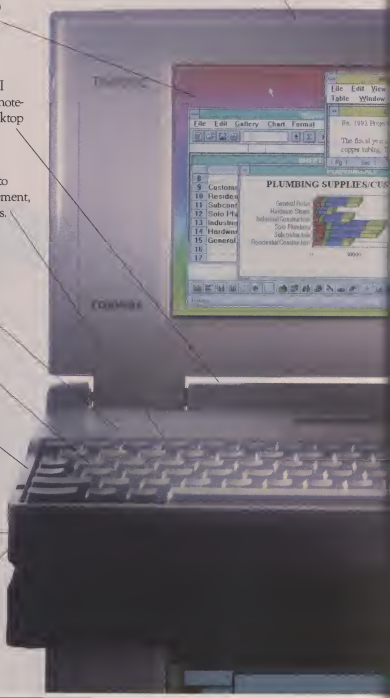

INTRODUCING THE

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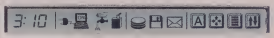

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TIPS AND TECHNIQUES TO BRING OUT THE BEST PERFORMANCE IN YOUR PC AND PERIPHERALS

MODEMS

STORE NUMBERS IN YOUR MODEM

Most Hayes-compatible modems have enough spare nonvolatile RAM (NVRAM) to store four phone numbers in the modem itself. To find out if yours does, load your communications software, enter terminal mode, and enter the following line

AT&V

Then press Enter. The modem will respond with a long status report, ending with the heading Telephone Numbers and four blank settings. To program in a phone number, enter AT&Z followed by the location for the number, an equal sign, and the number itself. For example, to fill location 0 with the number 555-1212, enter

AT&Z0=555-1212

To dial the number in an NVRAM location, use the ATDS command. For the number stored in location 0, enter

ATDS=0

If you want to change a number that's already programmed into an NVRAM location, simply repeat the AT&Z command with a new number. To remove a number from memory, enter an AT&Z command without a number following the equal sign.

M. J. JOHNSON
SAN FRANCISCO, CALIFORNIA

EXPANSION CARDS

THE CARD-SWAP QUICK FIX

Not all 8-bit or 16-bit expansion slots are created equal, even if they have the same electrical connections. If you experience system crashes or other errors that seem related to an expansion card—either during installation or afterward—you may be able to cure the problem by changing the order of the cards. Sometimes a tiny difference in position in an electrical circuit can throw the system's timing off—so shuffling your cards can help.

When you install your cards, place the memory expansion card and the disk controller as close to the power supply connector as possible—this creates a shorter path to the rest of the circuitry. Proximity depends on the availability of the right kind of slot for the card and on whether the cables are long enough to reach from the controller to the card. Your VGA or other video adapter should come next, then the I/O card and any other cards.

STEVE SACCO
AGOURA HILLS, CALIFORNIA

SYSTEMS

KEEP THE AIR FLOWING

The faster your CPU and the more hardware you have in your system, the greater the need for ventilation. Powerful PC hardware builds up a lot of heat, which can be hazardous.

Hardware Checklist

STEPS TO SMARTER SCANNING

The Scan command isn't the only thing you need to know to transfer an image from hard copy to a graphics file. The most overlooked element in scanning is the size of the final file—which can run to megabytes and can slow image processing to a crawl. Here are some tips for getting a no-compromise scan using the least disk space.

What's my line (art)? Text and black-and-white illustrations are the easiest scans to get right. They take up less disk space than grayscale or color scans, and the rule of thumb is to scan them at the resolution of the output device. For a dot matrix printer, that's typically between 120 and 180 dots per inch; for a laser printer, 300 to 600 dpi. On a 13-inch VGA monitor, it's around 75 dpi (the width of the screen divided by the horizontal resolution, which in VGA mode is 640 dpi).

Can you spare 24 bits? A 24-bit scanner reads 16.7 million colors—but at a huge cost in disk space. If you plan to display the scanned image on a VGA screen, you can display only around a millionth of those colors—usually 16, sometimes up to 256, but no more. On a laser printer, you can show only grays, so don't even consider using color scans. Your gray levels are limited by the hardware, too—a 300-dpi printer can approximate around 32 grays, and a 600-dpi printer, around 64. Scanning any more gray levels is a waste of disk space.

Make a resolution. The element that inflates graphics files most is resolution. Your output device determines the best resolution to use. As a rule of thumb, if you're printing color or gray at the same size as the original, scan it at a quarter to a third of the resolution of the printer or typesetter that will output it.

To calculate the optimal resolution more accurately, you need to know three things: the height of the output image, the height of the original, and the halftone resolution of the output device. For the best grayscale output from a 300-dpi dot matrix printer, the halftone resolution is around 53 lines per inch; for an ink jet or dot matrix printer, it's 45 lpi; for professional output, ask the typesetter. Then use this formula:

$$\text{Scanning resolution (dpi)} = \frac{(\text{lpi} \times 1.25 \times \text{final height of image})}{\text{original height}}$$

Format affects substance. Once the scanned graphic is in memory, there's one more factor that affects how much disk space it will occupy—the file format. The slimmest common file format is GIF, followed by compressed TIFF. If neither of these formats will do, PCX is a close third. Avoid uncompressed TIFF and BMP formats; these make an image file that is 50 percent larger than in PCX format.

MATTHEW LAKE
ASSOCIATE EDITOR

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Circle 156 on reader service card.

Your primary routine for ensuring proper ventilation should include a semiannual cleanup of your system to remove dust from the disk drives, motherboard, and especially your fan grille. Here are a few other techniques for minimizing the buildup of heat. Make sure all the removable slot plates at the back of your PC are in place. This makes the system fans work most efficiently. Also ensure that controller and power cables are routed away from the passage that fan-drawn air will take.

Finally, wherever possible, position the longest expansion cards toward the outer side of the case (usually the left side) and the shortest cards inside to maximize the space for air to flow through the PC.

BILL FIELDS
PHILADELPHIA, PENNSYLVANIA

MEMORY

CURE YOUR DEFECTIVE MEMORY

SIMMs come in different configurations, speeds, and prices. One configuration uses nine small memory chips, another only three, and they can come in any access time. Mixing configurations in the same memory bank often causes timing problems that may hang your system. If you experience intermittent memory problems—particularly with programs that require extended or expanded memory—an upper-memory SIMM may be at fault.

Run a diagnostic program (such as the DOS-based application MSD that ships with Windows) that tests memory. If that doesn't detect a problem, try moving the memory chips to the conventional memory slots to cause the problem to surface more rapidly: Remove your PC's cover, touch a grounded part of the system such as the power supply to remove any static charge you may have built up, and ease the modules from their sockets with a firm and even pull. Use extra caution when moving the SIMMs, since some of the plastic retaining clips are fragile. Place the SIMMs on an antistatic bag such as the ones that video boards ship in. Finally, place the modules in the conventional-memory slots. If problems persist, purchase a new SIMM and substitute it for each existing module in rotation until the problem clears up—a slow and arduous process, but the least wasteful way to succeed.

STEVE SACCO
AGOURA HILLS, CALIFORNIA

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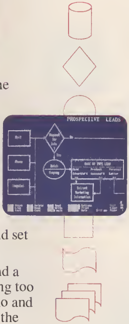

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Circle 224 on reader service card.

The death of DOS
Has been greatly exaggerated

DOS is still the preferred operating system on over 80% of the PCs in Fortune 1,000 companies, according to recent studies.

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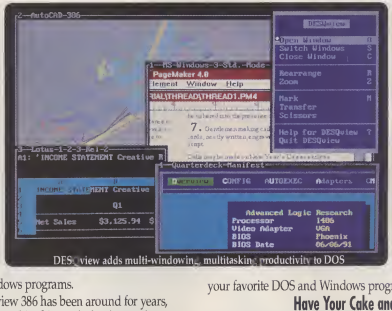
Many Fortune 1,000 companies are using DESQview™ as the best solution for keeping the dependability and familiarity of DOS programs and adding multitasking, windowing productivity. DESQview users give up nothing—since it actually runs MS Windows better should users wish to run Windows programs.

As you may know, DESQview 386 has been around for years, evolving into a highly efficient multitasking, windowing environment that extends the power of DOS, giving you increased productivity while conserving precious memory and disk space. In fact, the vast majority of 386 and 486 PCs need no additional memory or disk space to run DESQview.

DESQview 386 gives you pre-emptive multitasking like OS/2, but with ½th of the disk space and ⅓th of the memory requirements. It gives you windowing like MS Windows, but with greater speed and efficiency and fewer 'crashes.' And DESQview lets you use a mouse or stick to the keyboard.

You Create the Standards; We Follow.

We've never been confused about our role. We believe software companies exist to make your job easier and your working day more productive. When publishers step out of that mold and begin to tell you what hardware you need and that you should throw out



DESQview adds multi-windowing, multitasking productivity to DOS

somebody else's perfectly good software—well, they simply are not operating in your best interest.

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DESQview 386 comes with QEMM-386, the number one memory management utility, and Quarterdeck Manifest, the award-winning memory analysis and monitoring program. Between them, they assure you every last 'K' of memory is put to use*. In many cases, QEMM can mean the difference between running the TSRs you want and not having enough memory.

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* DESQview makes multitasking and windowing available to users of 286-class machines with similar memory efficiencies through QEMM-50/60 for IBM™ PS/® 50 and 60 users and QRAM for other 286 users.

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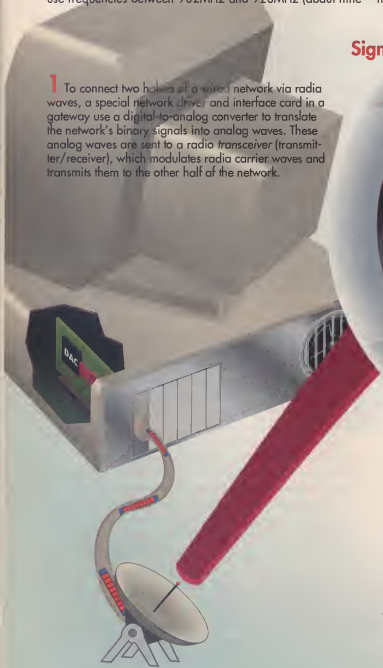
Radio-Wave Networking

LINKING NETWORK NODES BY SPREADING RADIO WAVES ACROSS A WIDE BANDWIDTH.

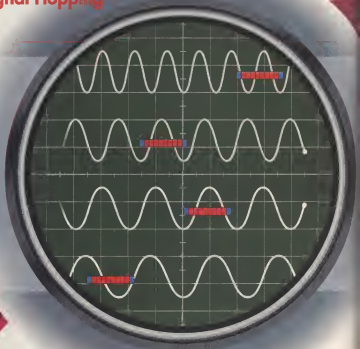
BY JOHN TASCHEK • ILLUSTRATION BY TIMOTHY EDWARD DOWNS

Radio-wave LANs typically connect PC nodes in different buildings. Network signals are carried on electromagnetic waves far both wired and radio-wave LANs, but radio networks usually use frequencies between 902MHz and 928MHz (about nine times the maximum frequency of FM radio). Since signals in the air cannot be shielded from interference, radio networks require more elaborate error-prevention techniques than infrared networks.



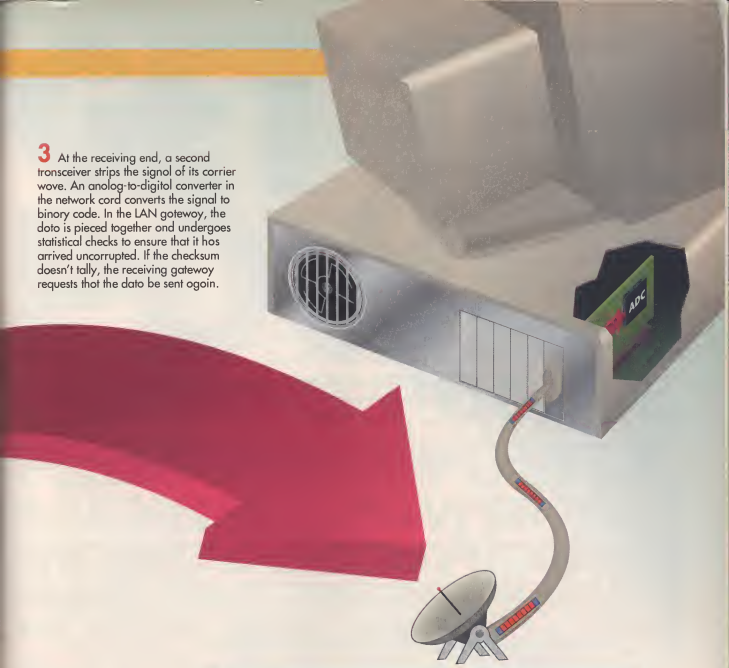
1 To connect two halves of a wired network via radio waves, a special network driver and interface card in a gateway use a digital-to-analog converter to translate the network's binary signals into analog waves. These analog waves are sent to a radio *transceiver* (transmitter/receiver), which modulates radio carrier waves and transmits them to the other half of the network.

Signal Hopping



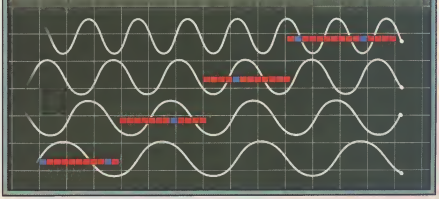
2 In a transmission technique known as *spread spectrum*, the signal is sent across a broad bandwidth of frequencies to minimize the danger of data loss (and thus the need to retransmit the data, which would slow down the network). In *signal hopping*, one type of spread-spectrum transmission, sophisticated transceivers send data for a few millisecands on one frequency, then change to another frequency. In a further attempt to reduce data loss, this type of spread-spectrum transmission uses redundancy—the same data is sent on several different frequencies in case interference on one end corrupts the signal.

3 At the receiving end, a second transceiver strips the signal of its carrier wave. An analog-to-digital converter in the network card converts the signal to binary code. In the LAN gateway, the data is pieced together and undergoes statistical checks to ensure that it has arrived uncorrupted. If the checksum doesn't tally, the receiving gateway requests that the data be sent again.



Direct Sequencing

Some transceivers don't switch frequencies in milliseconds but use a spread-spectrum technique called *direct sequencing*. This method uses a "chipping" code that breaks data into chunks for transmission across various frequencies. The receiving gateway reassembles the data using the same chipping algorithm.



AUTHORITATIVE ANSWERS TO YOUR MOST PRESSING PC QUESTIONS. BY DALE LEWALLEN AND JEFF PROSISE

What Is 386PART.PAR?

After I installed Windows on my 386, I noticed a hidden file named 386PART.PAR in the root directory of my hard disk. The file is bigger than 20MB, and it remains on the hard disk even when I'm not using Windows. Now that my hard disk is nearly full, can I safely delete the file to reclaim the disk space?

WILLIAM HARADA
MEMPHIS, TENNESSEE

386PART.PAR is Windows' permanent swap file; Windows uses it in 386 Enhanced mode to create virtual memory. Permanent swap files are faster than temporary swap files, but, as you noted, they consume precious disk space even when they're not in use. Temporary swap files, on the other hand, exist only while Windows is running. If you run Windows only occasionally and hard disk space is limited, you're better off switching to a temporary swap file.

To change from a permanent to a temporary swap file, open the Control Panel and click on 386 Enhanced. Click on the Virtual Memory button then click on Change. Select Temporary in the Type field, and enter the desired swap file in the Size box. Click on OK and then restart Windows. With a temporary swap file now in effect, you can delete 386PART.PAR from the root directory.

Data Interchange Challenge

I would like to transfer data from a PFS File record to a database in Microsoft Works. Also, I cannot access a Professional File database from a colleague. How can I access the data to transfer it from Professional File to Microsoft Works?

FRED LANDENBERGER
CARMICHAEL, CALIFORNIA

Most programs can share data by using common file formats. For example, the lingua franca of all word processors is ASCII. Many word processors also have begun to support Microsoft's Rich Text Format (RTF), which preserves some formatting information during the transfer process. In the spreadsheet world, most products can read and write the Lotus WK1 or the older DIF (Data Interchange Format) file format. And most database products can read and write dBASE III–format files. In addition, database products often can use either comma-separated variables (CSV) or the space-delimited file (SDF) format.

Note that file formats like ASCII and CSV don't maintain formatting information or other stylistic attributes generated in the first program. For example, if you export an ASCII file from WordPerfect and import it into Word for Windows, it will not retain any character formatting information like boldface or italic type or advanced features like tables and graphics.

Check to see if your programs can export and import data in one of these common file formats. For example, Microsoft Works reads Lotus WKS files, and the database portion of the product imports and exports data in both CSV and SDF formats (Microsoft Works calls them the "Text and Commas" and "Text & Tabs" options, respectively).

Help About...

DISK ARRAYS

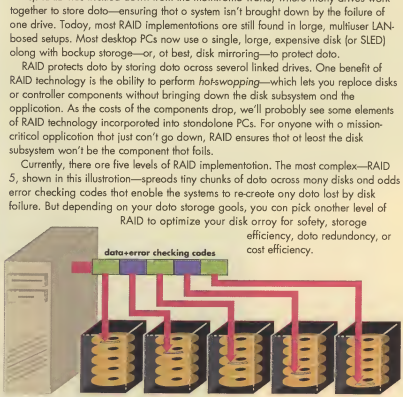
I'VE HEARD A LOT RECENTLY ABOUT DISK ARRAYS. THEY SOUND LIKE A GREAT IDEA, BUT WHEN I LOOK AT ADS FOR NEW SYSTEMS, DISK ARRAYS ARE RARELY MENTIONED. WHY AREN'T WE SEEING THESE ON PCS YET?

RON NICHOLS
HILO, HAWAII

Disk arrays conform to a technology called RAID (redundant array of inexpensive disks). RAID has trickled down from the mainframe world, where many drives work together to store data—ensuring that a system isn't brought down by the failure of one drive. Today, most RAID implementations are still found in large, multiuser LAN-based setups. Most desktop PCs now use a single, large, expensive disk (or SLED) along with backup storage—or, at best, disk mirroring—to protect data.

RAID protects data by storing data across several linked drives. One benefit of RAID technology is the ability to perform *hot-swapping*—which lets you replace disks or controller components without bringing down the disk subsystem and the application. As the costs of the components drop, we'll probably see some elements of RAID technology incorporated into standalone PCs. For anyone with a mission-critical application that just can't go down, RAID ensures that at least the disk subsystem won't be the component that fails.

Currently, there are five levels of RAID implementation. The most complex—RAID 5, shown in this illustration—spreads tiny chunks of data across many disks and adds error checking codes that enable the systems to re-create any data lost by disk failure. But depending on your data storage goals, you can pick another level of RAID to optimize your disk array for safety, storage efficiency, data redundancy, or cost efficiency.



RAID level 5

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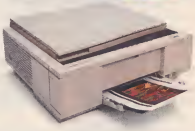

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THE POWER OF COLOR IS YOURS.

Circle 137 on reader service card.

Canon

ScanJet IIc and SCSI

I read the comments on the incompatibility between regular SCSI adapters and the Hewlett-Packard ScanJet IIc in the November 1992 Q&A ("One SCSI Fits All?" page 384). However, an HP regianal rep told me that the ScanJet IIc supparts SCSI-2 and ASPI—as lang as yau use Carel Systems' CarelSCSI and you laad the CorelSCSI driver befare the HP driver in yaur CONFIG.SYS file. If yau da this, yau can run the scanner with LS-2000 ar Adaptec ASPI-based SCSI contrallers. (The ScanJet Plus, hawever, wan't work in this configuratian, because it uses an alder proprietary SCSI-1 scheme.)

JACK L. CHALKER
WESTMINSTER, MARYLAND

Thanks for telling us that the combination of card and scanner can work. When we checked with Corel, the company noted that the current version of CorelSCSI does not support scanners (including the ScanJet IIc) but that a future version will likely provide extensive scanner support. Although the combination has not been through Corel's certification process and isn't officially supported by the company, the Corel representative noted that one reason the combination would work is that both Corel's LS-2000 SCSI card and HP's SCSI device for the ScanJet IIc use a common SCSI chip set from NCR.

32-bit Disk Access Problem

When I'm warking with Windows applications, I accasianally get an errar message that says, "The program tried ta access yaur hard disk in a way that is incompatible with the Windaws 32-bit disk access feature (WDCTRL). This may cause your system ta became unstable. Press any key ta cantinue." This errar accurs when I have left the camputer far a few minutes. Na harm has been done that I can detect, but I'm cancerned. What does the message mean, and what shauld I da abaut it?

DON PHILLIPS
MT. PLEASANT, NORTH CAROLINA

The error message is from FastDisk, the component of Windows 3.1 that speeds up hard disk accesses when Windows is running in protected mode on systems that have WD1003-compatible disk controllers.

The message means that your controller is not 100-percent compatible with the Western Digital drive. You need to disable FastDisk—and fast—before it does permanent harm to your hard disk that will require reformatting (and possibly repartitioning) to correct it.

Disabling FastDisk is easy. If you are in a hurry, you can do it directly from the DOS prompt. The quickest way is to enter WIN /D:F every time you start Windows. For a more permanent change, open the Control Panel and open the 386 Enhanced dialog box. In the dialog box, press the Change button, and then uncheck the Use 32-Bit Disk Access box at the bottom of the window. Restart Windows, and FastDisk will no longer be used.

If for some reason the Use 32-Bit Disk Access check box does not appear when you press Change, you'll have to disable FastDisk manually. Call up SYSTEM.INI in Notepad or the editor of your choice, and delete these lines from the [386Enh] section:

```
device=*int13
device=*wdctrl
```

In addition, change the line 32BitDiskAccess=On so that it reads 32BitDiskAccess=Off. Then restart Windows to have changes take effect.

Challenge

I'VE GROWN TIRED OF MOVING FILES ON MY HARD DISK BECAUSE I MUST FIRST COPY THE FILES, LOOK TO SEE WHETHER THEY WERE COPIED TO THE RIGHT PLACE, AND THEN DELETE THE OLD COPIES. I USE A FILE MANAGER NOW BUT WOULD APPRECIATE AN EASIER WAY TO DO THIS FROM THE COMMAND PROMPT.

KEN MOYER
RACINE, WISCONSIN

On the face af it, this looks like a pretty simple Challenge, right? All you shauld need to da is write a batch file that copies the files to the new directary and deletes the originals. But there are several prablems with that apprach. For example, da you know whether the files arrived at the destinatian correctly? And what happens if the target drive doesn't have enough space for the new files? Our Challenge winner will be the one who foresees the problems involved in a move operation and then handles them intelligently. To paraphrase the Hippocratic oath: "First, lose no files." Want to take the Challenge? If so, drop a letter to us marked "April Challenge." If we publish yaur solution, we'll convey our thanks by sending you a *PC/Computing* "I Solved the Challenge" T-shirt. Be sure to include yaur shirt size: S, M, L, or XL.

CHALLENGE SOLVED

Our December Challenge came from a reader who wanted tips on conserving laptop battery power so that he could work through a transcontinental flight. Surprisingly, we didn't get our usual deluge of responses for this Challenge—which suggests to us that battery duration is so hopelessly short that you don't even try! Nonetheless, our winning Challenge submission comes from frequent traveler Robert Hanson of Seattle, Washington. He suggests that after using the manufacturer's power-management utilities for turning off the hard disk and backlight when they aren't needed, you try the following steps:

- Use a RAM disk to store frequently used files, and save them to the hard disk only accasionally to keep the disk from spinning unnecessarily.
- Use a disk cache to use the hard disk more efficiently.

To Robert's suggestions, we add these:

- If you're using Windows on a gas plasma display, choose the Plasma Power Saver color scheme in the Windows 3.1 Control Panel.
- Save even more power by using Craig Stinson's monochrame color scheme from the February 1992 Windows column ("Taking Your Windows Show on the Raad," page 270).

FREE FAST FACTS BINDER

Each month *PC/Computing* publishes helpful Fast Facts cards to give you instant access to the information you need most. In coming months, we'll bring you Fast Facts on Windows shortcuts, DOS commands, and other tips to make your computing life easier.

Mail in this tear-out card, and we'll send you a free binder that fits on your keyboard so that your Fast Facts cards will always be handy.

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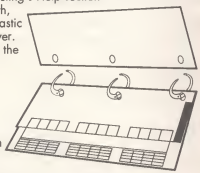
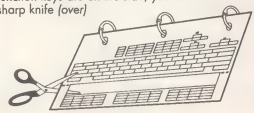
I would like to see future Fast Facts cards about:

How to Use Fast Facts and Your Free Facts Binder

■ Open the three binder rings and put them through the holes on the binder's large back cover (which has a keyboard template printed on it). Add the Fast Facts card, available in *PC/Computing's* Help section each month, and the plastic binder cover. Then snap the rings shut.



■ Position the binder on your keyboard. If you have a keyboard with function keys placed horizontally across the top, the binder will fit over them nicely. If your function keys are on the side, you can use a sharp knife *(over)*



Fast Facts

PC/Computing

APRIL 1993

Extended TrueType Characters
Generate these characters under Windows 3.1 by holding down Alt and pressing the numeric keypad's 0 followed by the three numbers in the Keystrokes row.

Keystrokes (Alt-0 plus)	129	130	131	132	133	134	135	136	137	138	139	140	141	142
Arial	□	‚	ƒ	„	…	†	‡	ˆ	‰	Š	‹	Œ	□	□
Courier New	□	□	□	□	□	□	□	‹	‰	Š	‹	Œ	□	□
Symbol	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Times New Roman	□	‚	ƒ	„	…	†	‡	‹	‰	Š	‹	Œ	□	□
WingDings	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭

(continued on other side)

TrueType Fonts

Keystrokes (Alt-O plus)	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167
Arial	□	□	'	'	"	"	·	–	—	~	™	š	ˇ	œ	□	□	ŷ		¡	¢	£	¤	¥	¦	§
Courier New	□	□	'	'	"	"	·	–	—	~	™	š	ˇ	œ	□	□	ŷ		¡	¢	£	¤	¥	¦	§
Symbol	□	□	'	'	"	"	·	–	—	~	□	□	□	□	□	□	□	□	¡	¢	£	¤	¥	¦	§
Times New Roman	□	□	'	'	"	"	·	–	—	~	TM	š	ˇ	œ	□	□	ŷ		¡	¢	£	¤	¥	¦	§
WingDings	❹	❺	❻	❼	❽	❾	❿	☙	☙	☙	☙	☙	☙	☙	☙	☙	•	·	○	☙	●	◎	⊙	○	■

Keystrokes (Alt-O plus)	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192
Arial	¨	©	ª	«	¬	-	®	¯	°	±	²	³	´	µ	¶	·	¹	º	»	¼	½	¾	¿	À	Á
Courier New	¨	©	ª	«	¬	-	®	¯	°	±	²	³	´	µ	¶	·	¹	º	»	¼	½	¾	¿	À	Á
Symbol	◆	►	◆	↔	↓	←	↑	→	°	±	″	≥	×	∝	∂	•	′	≡	≈	…	—	↵	⊗	⊕	∅
Times New Roman	¨	©	ª	«	¬	-	®	¯	°	±	²	³	´	µ	¶	·	¹	º	»	¼	½	¾	¿	À	Á
WingDings	□	➢	✦	★	★	★	✸	✸	✠	✧	✧	⌑	✧	✪	☆	✧	✧	✧	✧	✧	✧	✧	✧	✧	✧

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or heavy scissors to cut off the bottom port of the binder that fits over horizontally placed function keys. Discard the bottom, and the rest of the binder will fit on your keyboard.

■ After positioning the binder, make a note of four places on your keyboard to attach Velcro tabs to hold your binder in place. Peel the adhesive backing off one side of each of the four tabs, and press them into position on your keyboard. Then press the Velcro halves of each tab firmly together. Peel the remaining backing off the top halves of the tabs, and press your binder against the exposed adhesive surface.

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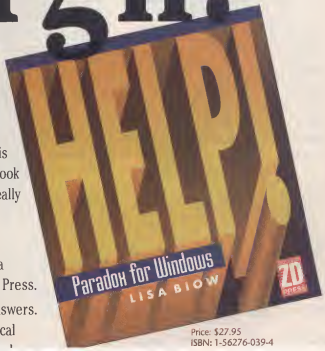

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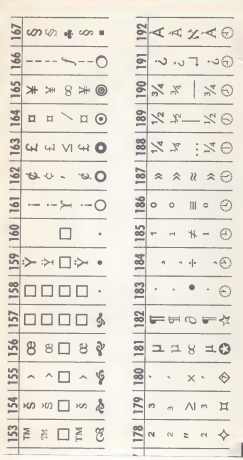

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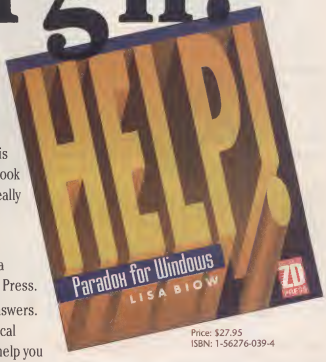

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XCOPY and "Disk Full" Errors

You have written occasionally in your column about using the DOS XCOPY command, and I'm sure you mentioned the prompt to insert another disk when the target disk is full. I've reviewed several DOS manuals and can find no reference to this technique. When I try to use XCOPY and the target disk becomes full before all files are copied, I receive a "disk full" error message. Am I doing something wrong?

BILL COLEMAN
WACO, TEXAS

XCOPY never prompts you to insert another disk. But we have mentioned a clever use of XCOPY's /M switch that, in conjunction with the ATTRIB command, lets you copy a set of files to a series of disks if they won't fit on just one. Here's an example: Let's say that the C:\DOC directory of your hard disk contains 1MB of files and that you want to copy all the files to a set of 360K floppies in drive A:. To accomplish this, type

```
ATTRIB +A C:\DOC\*.*
XCOPY C:\DOC A: /M
```

Then, when you get a "disk full" message, insert a new floppy in drive A: and type

```
XCOPY C:\DOC A: /M
```

again, repeating this process until all the files are copied. The ATTRIB command sets the archive attribute on all files in the directory. The /M switch tells XCOPY to copy only files whose archive attributes are set and to clear the attribute after each file is copied. Files that have already been copied are not copied again, because their archive attributes are no longer set.

This technique works fine—as long as no single file is too large to fit on a single floppy disk. If one or more of the files is too large, you can still transfer them to floppies by using the BACKUP command. However, files that have been copied with the BACKUP command must be retrieved on the other end with DOS's RESTORE command.

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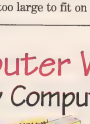

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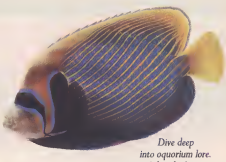

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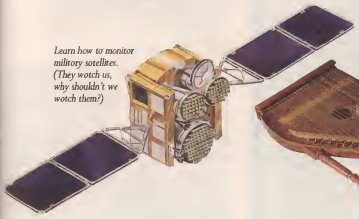

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AS EASY AS	ASEASY.ZIP ASADOC.ZIP	Blindingly fast Lotus® 1-2-3® clone with extra features like depreciation and interpolation.	PBSAPPS LIB 6 DOS Applications
Catacomb Abyss	CATAB1.ZIP CATAB2.ZIP CATAB3.ZIP	A role-playing tale of wizards, magic and fantasy trips into other dimensions. (May be too graphic for some children.)	PBSARC LIB 3 DOS Games
Multimedia Workshop	MMWS1.ZIP MMWS2.ZIP	Create multimedia presentations in mono, CGA, EGA or VGA. Includes 10 samples of digitized speech.	PBSAPPS LIB 6 DOS Applications
Print Screen Manager	**PSMAN.ZIP**	**Inexpensive alternative to screen capture utilities lets you direct screen prints to the printer, a disk file or the clipboard.**	PBSAPPS LIB 4 Windows Utilities
GetBack	GTBAK.ZIP	Easy-to-use backup/restore program does full or incremental backups, compresses output and more.	PBSAPPS LIB 3 DOS Utilities
Cedar Island Link	CILINK.ZIP	Full-featured communications software with pass-through mouse control (use your mouse to select items on the remote system's menus).	PBSAPPS LIB 12 Communication
DOS Extensions for Pros	DOSEXT.ZIP	Includes DOS 5 Help system information. Set up to be easily used with DOSSHELL. Requires DOS 3.0 or higher.	PBSAPPS LIB 3 DOS Utilities
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FILE MANAGEMENT

UNDELETE NETWORK FILES

You've just deleted an important file on your Novell NetWare network drive, and your UNDELETE utilities work only on DOS drives. Don't despair. NetWare's Salvage utility can restore any undeleted file on a network drive, even if several deleted files share the same name—and it's easier than DOS's UNDELETE. Type SALVAGE at the DOS prompt, and a menu-driven program pops up.

To change the directory, move the highlight bar to Select Current Directory and press Enter. Backspace over the Current Directory Path and type in the correct directory, or press Insert to use the menu system. Once you have the correct directory, press Esc, Enter to return to the Salvage menu, then choose View, Recover Deleted Files, and press Enter. Type in a file extension for Erased File Name Pattern to Match, or press Enter to view all deleted files.

Type in the first few letters of the file you want to restore, and the highlight bar jumps to the file. Select multiple files with the F5 key, then press the Enter key twice to restore the marked files.

Alternatively, select Salvage Options on the main menu to sort files based on Filename, File Size, Deletor, and Deletion Date. This is important because there could be several files with the same name.

Note: Salvage works on NetWare drives only, and you need File Scan and Create rights to run it.

JOHN TASCHEK
ASSISTANT EDITOR

NDIR FILTER FINDS LOST FILES

Need to find a file you've changed in the last week but you've forgotten the title? NetWare's NDIR command has sorting parameters that zoom you to the correct file with a single command. NDIR's syntax differs slightly from DOS's DIR command.

```
NDIR [f:\path\filename...] /
 [option1, option2,...]
```

To search for all files located on the directory YOURDRIV and accessed since March 1, for example, type

```
NDIR F:\YOURDRIV /ACCESS AFT
 03/01/93
```

NetWare lists the matching files on-screen with size, access date, and attribute information. If you use ACCESS, NetWare expects a sort specification, such as a date modified by AFT (for after), BEF (before), or an equal sign (=).

With the SIZE switch, the NDIR command narrows the search of the current directory based on size:

```
NDIR /SIZE GR 30720 ACCESS AFT
 03/01/93
```

The SIZE switch indicates the sort criterion, GR means greater than, and 30720 indicates the file's size in bytes (30K). Use LE for a file size smaller than the number following it. The next sort is performed on Access Date with the ACCESS switch, and AFT indicates that the search should take place before the date parameter that follows. NetWare requires a slash (/) before the first option (SIZE) but not the second (ACCESS).

Along with access date and size, you can easily sort files based on who created them and when they were last modified. If you access a shared directory in which several people create and edit files, for example, enter this command to find the files created by USERID ALYSSAT that were updated before April 5:

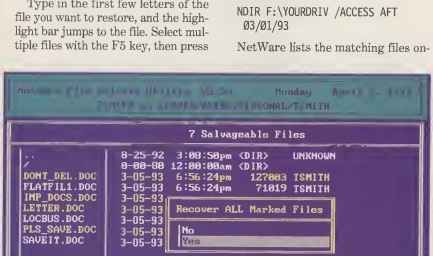
```
NDIR /OWNER=ALYSSAT UPDATED BEF
 04/05/93
```

Two other useful NDIR lookup variables are CREATE (CR) and ARCHIVE (AR). To find all files created after April 1, for example, enter this command at a network drive prompt:

```
NDIR /CREATE AFT 04/01/93
```

Replace CREATE with ARCHIVE to find files with an archive bit—useful for files that need to be backed up.

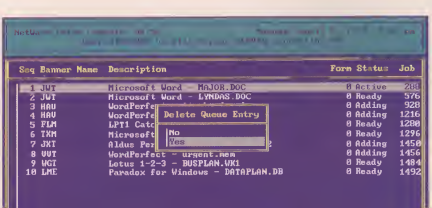
JOHN TASCHEK
ASSISTANT EDITOR



NetWare's Salvage does something that DOS's UNDELETE can't do—recover deleted files on a network drive. Just enter SALVAGE at a network drive prompt, and follow the menus.

HALT PRINT JOBS

Have you ever accidentally issued a command to print an entire 250-page document instead of the half-page selection you actually wanted? After you have canceled the command program, zap whatever got through the wire to the print server. Shell out to DOS and then enter the PCONSOLE command. Select Print Queue Information from the first dialog box, choose the printer



You can stop runaway print jobs and save paper to boot. NetWare's PCONSOLE program gives you complete control over your printouts.

you want to use from the list in the Print Queues dialog box (your current printer may not be highlighted by default), and press Enter. Under Print Queue Information, select Current Print Job Entries, and press Enter. Find your job in the list by searching the Banner Name column for your network ID and the Description column for the application and filename of the errant print job. To remove it from the queue, press Del. Press Esc to quit each successive dialog box.

MATTHEW LAKE
ASSOCIATE EDITOR

DATA PROTECTION

FILE FLAGS PREVENT DELETION

Using DOS alone, the best way to protect a file from deletion is to use the ATTRIB +R command. The only problem is that you can't edit a Read Only file. However, NetWare's implementation of ATTRIB—a powerful utility called Flag—has a Delete Inhibit switch that allows you to modify a file but not delete it. To flag a file as delete inhibited, use this syntax:

FLAG *filename.txt* DI

You can also flag multiple files easily by using wildcards. To add a further layer of protection, try the H switch, which hides files from DOS commands and applications. Combine attributes by placing them on the command line separated by a space. To delete-inhibit and hide your file, for example, enter the following line:

FLAG *filename.txt* DI H

To remove individual file attributes, place a minus sign (-) before the attribute you want to delete. To set your file attributes back to normal (read/write, unhidden), type the following command:

FLAG *filename.txt* N

It can get tough to track which files have which attributes—especially if you rely on DOS's DIR command. To see all the filenames in a directory—including hidden ones—enter the FLAG command with no switches on.

Note: File attributes set with DOS's ATTRIB and NetWare's Flag are interchangeable. For example, Flag will read any attribute set by ATTRIB. However, ATTRIB will ignore the extra switches that Flag contains, and you can't use Flag on a DOS drive.

JOHN TASCHEK
ASSISTANT EDITOR

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PC/Computing (ISSN 0899-1847) is published monthly by Ziff-Davis Publishing Company, a division of Ziff Communications Company, One Park Ave., New York, NY 10016. Second Class postage paid at New York, NY 10016 and at additional mailing offices. Postmaster: Send address changes to *PC/Computing*, P.O. Box 58229, Boulder, CO 80321-8229.

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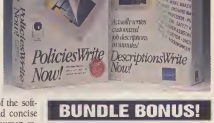

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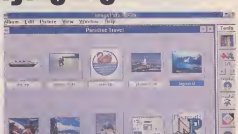

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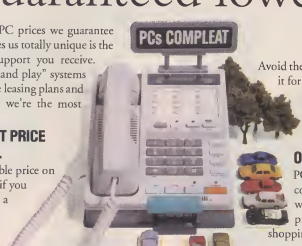

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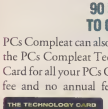

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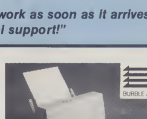

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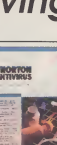

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	Value Point 77 486DX2 486SX SVR 85	
6450128 (4Meg)	56 57, 57SLC 90 95 P75 57SLC	149.00
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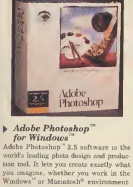

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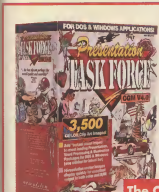

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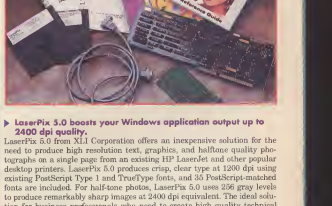

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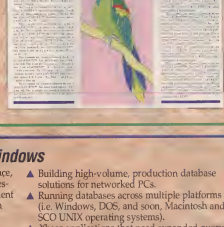

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Circle the numbers below corresponding to products featured in this issue's advertisements and listed in the Editorial Product Index. Manufacturers will mail product literature to you free of charge.

Void after July 31, 1993

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Please answer questions below:

1. **Where do you use your computer?** (Check one only):
   A. ☐ Home B. ☐ Business C. ☐ Both
2. **What kinds of computers do you use?** (Check all that apply):
   D. ☐ IBM/Compatible Laptop E. ☐ IBM/Compatible Desktop F. ☐ MAC
3. **Do you plan to buy any of the hardware or software mentioned below in the next three months?** (Check all that apply):

HARDWARE
G. ☐ PC
H. ☐ MAC
I. ☐ Laptop
J. ☐ Printer
K. ☐ Monitor
L. ☐ Disk/Tape Back-up
M. ☐ Add-in Board
N. ☐ Modem
O. ☐ Input Device
P. ☐ Local Area Network

SOFTWARE
Q. ☐ Accounting
R. ☐ Spreadsheet
S. ☐ Personal Finance
T. ☐ Desktop Publishing
U. ☐ Word Processor
V. ☐ Database Manager
W. ☐ Graphics
X. ☐ Utility
Y. ☐ Communications
Z. ☐ Windows/Multi-tasking
1. ☐ Programming Language/Compiler
2. ☐ Integrated/Multifunction
3. ☐ CAD

4. **From which of this following sources do you purchase personal computer products?** (Check all that apply):
   4. ☐ Specialty Computer Retail Stores
   5. ☐ Mail Order Firms
   6. ☐ Direct from Manufacturers
   7. ☐ Other

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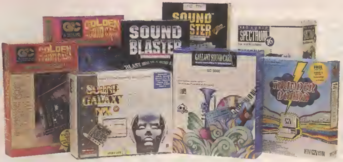
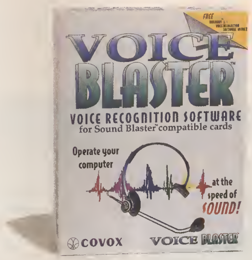


now you can *TALK* to your computer with THIS!



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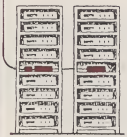

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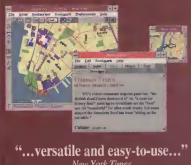

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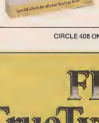

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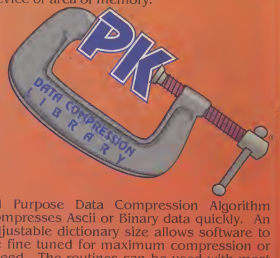

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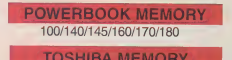

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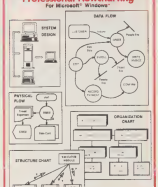

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All you had to do was clip it and give it to a sucker. The chump would call the 800 number for the too-good-to-be-true package and get a tape of me berating them for being duped.

It worked too well. You people are amazing. You handed it out, copied it, and faxed it. At least a few of you scanned it and e-mailed it all over hell. And the folks down at Rosenthal Direct Response, in Sudbury, Massachusetts, did such a great job on the ad that all those suckers you sent the ad to swallowed it hook, line, sinker, rod, reel, and part of the dock. My editor, Carol Day, gave it to Bill Machrone, the cheese from ZD Labs and *PC Mag*. He looked at the ad and picked up the phone.

We got calls. So many that the magazine's entire voice-mail system crashed. The line rang constantly and was always busy, so people started calling the main switchboard, driving the receptionists nutty and tying up that line.

Facilities telecommunications staff set up ten more answering machines, all with my berating voice. A staff person was taking calls full time, calming people down and referring them to the legal department. Some dope said he'd sold his car to buy the package, and now he was going to sue. Compaq was so inundated that it threatened to pull the plug on all future advertising with us.

People wrote half-assed pseudo-legalese letters saying they "accepted the offer on page 344"—I guess they figured that if they sounded official, the police would make us give them a computer.

Our little joke got lots of national press coverage, most of it bad. It was an irresponsible, stupid joke.

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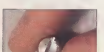

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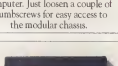
With our accelerated local bus video revving up your screen, who needs a VCR?

GUARANTEED COMPATIBILITY.
Our computers are network-compatible with Novell, Banyan, and UNIX® systems. And we're the only company with a written compatibility guarantee.*

THE DELL 433s/M i486 SX 33MHz SYSTEM

- LEASE: $74/MO
- 4MB RAM
- 170MB (17ms) HARD DRIVE
- 6 ISA EXPANSION SLOTS
- UPGRADEABLE PROCESSOR
- ACCELERATED LOCAL BUS VIDEO WITH 1MB VIDEO RAM (UP TO 19 MILLION WINMARKS)‡
- SVGA 1024I MONITOR (14", 1024 X 768, .28mm)
- ONE DISKETTE DRIVE (3.5" OR 5.25")
- MS-DOS 5.0



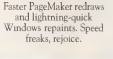
UP TO 160% FASTER VIDEO.
Faster PageMaker redraws and lightning-quick Windows repaints. Speed freaks, rejoice.

GREATER UPGRADEABILITY.
You can upgrade all the way to the top 486, the 66MHz DX2. You'll even be able to add the Pentium™ technology from Intel.

SYSTEM PERFORMANCE BOOSTED 26%.
With our optimized cache as an option, you can give your system a boost whenever you want.

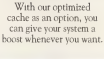
THE DELL 466/ME i486 DX2 66MHz SYSTEM

- LEASE: $111/MO.
- 4MB RAM
- 170MB (17ms) HARD DRIVE
- 4 EISA EXPANSION SLOTS
- 2 ISA EXPANSION SLOTS
- UPGRADEABLE PROCESSOR
- ACCELERATED LOCAL BUS VIDEO WITH 1MB VIDEO RAM (UP TO 29 MILLION WINMARKS)‡
- ULTRASCAN™ 14C MONITOR (14", 1024 X 768, .28mm, NI)
- ONE DISKETTE DRIVE (3.5" OR 5.25")
- MS-DOS 5.0



UP TO FOUR TIMES FASTER DATA TRANSFER THAN ISA.
You get a 32-bit EISA expansion bus that transfers data at up to 33 megabytes a second. To understand what it does for your computer, drink about eight million cups of coffee.

GUARANTEED ACCOUNTABILITY.
We're the only computer company to guarantee*–in writing–compatibility, fast response to your questions, and quick service.* Two-thirds of the FORTUNE 500® companies rely on us. So should you.



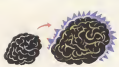
GOOD NEWS FOR THE POWER HUNGRY.
It's easy to upgrade to the top 486, the 66MHz DX2. If you're still power hungry, you can add Pentium technology—the next generation from Intel.

THE DELL 433/T i486 DX 33MHz SYSTEM

- LEASE: $91/MO
- 4MB RAM
- 230MB (16ms) HARD DRIVE
- 8 ISA EXPANSION SLOTS
- UPGRADEABLE PROCESSOR
- ACCELERATED LOCAL BUS VIDEO WITH 1MB VIDEO RAM (UP TO 19 MILLION WINMARKS)‡
- SVGA 1024I MONITOR (14", 1024 X 768, .28mm)
- ONE DISKETTE DRIVE (3.5" OR 5.25")
- MS-DOS 5.0

UP TO 18% FASTER SYSTEM PERFORMANCE.
Good thing you don't have to worry about the highway patrol.

33% MORE SLOTS.
With eight slots, you can add the network and communication cards you need for a great low-cost server.



UP TO 86% MORE DISK CAPACITY.
Our floor-standing model has a disk capacity of up to three gigabytes. Talk about mind-expanding performance...

Each system is custom-built. With 18 different models in our 486 line — covering 25MHz, 33MHz, 50MHz, and 66MHz — you can configure just the system you need. In fact, with our complete line of storage, memory, graphics and connectivity products, we can build over 15,000 different configurations.

OUCH! EEK! OOW! STOP! #@%!

When Dell cut prices up to $300 on its Performance Series, IBM and Compaq reacted with a few choice words. The price cuts aren't the only thing that they reacted to; these systems already offered up to 50% better performance than our previous systems, and at up to 25% lower prices. Yikes!

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DELL PERFORMANCE SERIES
425s/L i486 SX 25MHz

NOW $1,599

(SAVE $469)

Laugh while you can.
All good things must come to an end. This offer, for instance, ends March 31.

All this for just $1,599? HA HA HA HA HA HA HA HA!

DELL® 425s/L i486™ SX 25MHz SYSTEM

- LEASE[1]: $59/MO.
- 4MB RAM
- 170MB (17ms) HARD DRIVE
- 3 ISA EXPANSION SLOTS
- UPGRADEABLE PROCESSOR
- ACCELERATED LOCAL BUS VIDEO WITH 512Kb VIDEO RAM
- ULTRASCAN™ 14C MONITOR (14", 1024 x 768, .28mm, NI)
- DUAL DISKETTE DRIVES (3.5" AND 5.25")
- MS-DOS® 5.0/MICROSOFT® WINDOWS™ 3.1/ MOUSE

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Very Serious Video Performance.
Our accelerated local bus video gives you up to three times the video speed of IBM ValuePoint's or Compaq Prolinea's non-local bus video[1]. Which makes them look, well, laughable.

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